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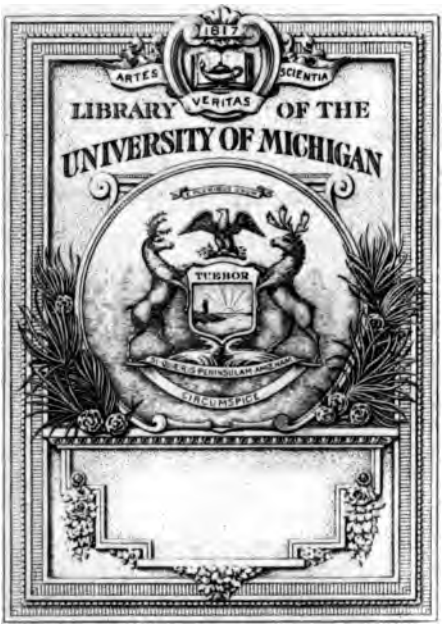
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PRICES OF ARMOR FOR NAVAL VESSELS.

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INVESTIGATION

BY THE

COMMITTEE ON NAVAL AFFAIRS

OF THE

UNITED STATES SENATE

IN RELATION TO

PRICES PAID FOR ARMOR FOR VESSELS OF THE NAVY.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1896.

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PRICES OF ARMOR FOR NAVAL VESSELS.

INVESTIGATION BY THE COMMITTEE ON NAVAL AFFAIRS OF THE UNITED STATES SENATE IN RELATION TO THE PRICES PAID FOR ARMOR FOR VESSELS OF THE NAVY.

WASHINGTON, D. C., *January 8, 1896.*

The committee met at 11 o'clock a. m.

Present: Senators CAMERON (chairman), HALE, PERKINS, MCMILLAN, CHANDLER, BACON, and TILLMAN.

The CHAIRMAN. The committee is about to enter upon the inquiry which the Senate directed should be made by a resolution agreed to December 31, 1895. The resolution read as follows:

Resolved, That the Committee on Naval Affairs be directed to inquire whether the prices paid, or agreed to be paid for armor for vessels of the Navy have been fair and reasonable; also, whether any prices paid have been increased on account of patent processes used for the introduction of nickel, or for cementation by the Harvey process; and if so, whether the increases in price are fair and reasonable; whether the issuance of any of the patents was expedited at the request of the Navy Department; whether such patents were properly issued and were for inventions not previously known or used, and who were and are the owners of such patents; whether any officers of the Government were interested therein, or at the time when any contracts were made were, or have since been, interested in the patents or employed by the owners thereof, and whether any legislation is necessary to further promote the manufacture and cheapen the price of armor for vessels of the Navy.

It was ordered that the chairman transmit to the Secretary of the Navy the resolution of the Senate and the following memorandum, with the request to examine them and inform the committee whether it would be his pleasure to appear before the committee at some convenient time and give the information desired.

The memorandum transmitted in pursuance of the above order is as follows:

MEMORANDUM FOR SENATOR CAMERON, CHAIRMAN OF THE SENATE NAVAL COMMITTEE.

The following suggestions are made in reference to the investigation to be conducted by the committee under the resolution of the Senate adopted December 31, 1895:

(1) That the inclosed memorandum be submitted to the Secretary of the Navy with the request that he will, if disposed to appear before the committee, prepare himself to give all available information within the Department or within his knowledge concerning the four points of the memorandum. The following particulars are suggested in connection with or addition to the points of the memorandum as to which it will be desirable to interrogate him when he comes before the committee.

(2) What reason, if any, can be discovered why Secretary Tracy provided the fund of 2 cents per pound of armor made under the contract of the Carnegie Steel Company in addition to the prices paid for the armor, when the Bethlehem Iron Company paid the royalties out of the prices received by them for armor.

(3) How many requests have been made by the Navy Department since March 4, 1881, for the expediting of patent cases in the Patent Office, and in what cases and with what result.

(4) How many contracts have been made by the Navy Department for the use of the Harvey patents. (Copies of all these should be produced.)

(5) Does it appear that the Department, having requested that the Harvey patent case be made special, took any steps to ascertain whether or not the invention was novel, and to oppose its issue in case it could be proved to be nonpatentable.

(6) When did the Department first have knowledge that Commander Folger was to be employed or had been employed by the Harvey Company or was to have an interest in the company. What contracts had been made for the Harvey process before Commander Folger ceased to be chief of the Bureau. What contracts were in process of arrangement while he was chief of the Bureau, and how soon after he left the Bureau were additional contracts made with the Harvey Company.

(7) What has been the rule, if any, or the practice of the Navy Department with reference to patents in which officers of the Navy have been interested.

(8) To what extent, and in what cases, have officers of the Navy been interested in patents which have been pressed upon, or of which use has been made by the Department. (A particular list of all such cases should be furnished.)

(9) What gross amounts have been paid by the Navy Department for armor for vessels of the Navy to the Bethlehem Iron Company and to the Carnegie Steel Company.

(10) What are the additional amounts likely to be paid out to fulfill existing contracts, and to what amount is the Department now authorized to make further contracts for armor.

The Secretary should also be requested to furnish to the committee any facts within his knowledge, or of which he has heard in any way, which may tend to throw light upon the subject of the investigation, whether specifically asked about those facts or not, and he should also be requested to make any suggestions and to express any opinions which he may think wise.

WM. E. CHANDLER.

JANUARY 4, 1896.

STATEMENTS REQUIRING INVESTIGATION IN CONNECTION WITH THE ARMOR CONTRACTS OF THE NAVY DEPARTMENT.

I.

That the prices to be paid for armor under Secretary Whitney's contract with the Bethlehem Iron Company of June 1, 1887, were from $500 to $650 per ton; and the prices to be paid under Secretary Tracy's contract with the Carnegie Steel Company of November 20, 1890, were the same; and like prices were to be paid for armor under subsequent contracts made by Secretary Tracy with the Carnegie Steel Company on February 28, 1893, and with the Bethlehem Iron Company on March

1, 1893, and that these prices are too high, as proved by the fact that the Bethlehem Iron Company has recently made contracts with the Russian Government to furnish similar armor at a price understood to be about $300 per ton.

II.

That the contract of Secretary Whitney required the Bethlehem Iron Company to pay all royalties to patentees of processes necessary to be used in making the armor, and that the company did so pay large sums of money to patentees of the nickel steel process, while in the contract of Secretary Tracy with the Carnegie Steel Company of November 20, 1890, it is provided that there shall be a fund amounting to the sum of 2 cents per pound of armor made with which to contest the legality of the nickel steel patents or to pay any amount which the patentees may recover, but that Secretary Tracy agreed that the Government should pay this sum of 2 cents per pound in addition to the prices paid for the armor, although the Bethlehem Iron Company pay the royalties out of the prices received by them for the armor.

III.

That one Hayward A. Harvey had a patent issued on January 10, 1888, for hardening armor plate, and that on April 1, 1891, he filed an application for a patent, on a modification of the process, which on June 11, 1891, was rejected because prior patents covered "the well-known step of hardening by chilling." On June 17, 1891, the application of April 1 was canceled and a new one filed. On June 20 Secretary Tracy wrote the Secretary of the Interior requesting that the application be made special in the Patent Office. The new patent was issued September 29, 1891. In the summer of 1892 a contract was made by the Navy Department with Harvey for the use of his patent and an additional contract was made with him in the spring of 1893, by which he was to be paid $11.50 per ton on armor treated by the process; and in the contracts of the Navy Department with the Bethlehem Iron Company of March 1, 1893, and the Carnegie Steel Company of February 28, 1893, the Government required the use of the Harvey process, agreed to pay the contractors $100, $78, and $50 per ton, according to the thickness of the armor, as an extra compensation for treating the armor by the process, and assumed all the expense for the royalties to be paid to the Harvey Company on the patents; the expediting of the issue of the Harvey patent, and the adoption of the process, having been, it is suggested, brought about by improper influences.

Specifically, it is stated that Commander William M. Folger, Chief of the Ordnance Bureau in the Navy Department, induced the expediting of the Harvey patent and the adoption of the process in the manufacture of armor, by reason of an understanding that he should be employed by the company organized by Mr. Harvey and have an interest therein; that in January, 1893, after the first contract had been made with the company and after the second contract had been arranged, but before it had been actually executed, he resigned as chief of the Bureau, and while continuing to be a commander in the Navy he accepted employment from the Harvey Company for a salary of $5,000 per year and a bonus of 200 shares of stock in the company and went abroad to negotiate contracts with foreign Governments for the use of the Harvey process.

At 12 o'clock m. the committee adjourned.

(2) What reason, if any, can be discovered why Secretary Tracy provided the fund of 2 cents per pound of armor made under the contract of the Carnegie Steel Company in addition to the prices paid for the armor, when the Bethlehem Iron Company paid the royalties out of the prices received by them for armor.

(3) How many requests have been made by the Navy Department since March 4, 1881, for the expediting of patent cases in the Patent Office, and in what cases and with what result.

(4) How many contracts have been made by the Navy Department for the use of the Harvey patents. (Copies of all these should be produced.)

(5) Does it appear that the Department, having requested that the Harvey patent case be made special, took any steps to ascertain whether or not the invention was novel, and to oppose its issue in case it could be proved to be nonpatentable.

(6) When did the Department first have knowledge that Commander Folger was to be employed or had been employed by the Harvey Company or was to have an interest in the company. What contracts had been made for the Harvey process before Commander Folger ceased to be chief of the Bureau. What contracts were in process of arrangement while he was chief of the Bureau, and how soon after he left the Bureau were additional contracts made with the Harvey Company.

(7) What has been the rule, if any, or the practice of the Navy Department with reference to patents in which officers of the Navy have been interested.

(8) To what extent, and in what cases, have officers of the Navy been interested in patents which have been pressed upon, or of which use has been made by the Department. (A particular list of all such cases should be furnished.)

(9) What gross amounts have been paid by the Navy Department for armor for vessels of the Navy to the Bethlehem Iron Company and to the Carnegie Steel Company.

(10) What are the additional amounts likely to be paid out to fulfill existing contracts, and to what amount is the Department now authorized to make further contracts for armor.

The Secretary should also be requested to furnish to the committee any facts within his knowledge, or of which he has heard in any way, which may tend to throw light upon the subject of the investigation, whether specifically asked about those facts or not, and he should also be requested to make any suggestions and to express any opinions which he may think wise.

WM. E. CHANDLER.

JANUARY 4, 1896.

STATEMENTS REQUIRING INVESTIGATION IN CONNECTION WITH THE ARMOR CONTRACTS OF THE NAVY DEPARTMENT.

I.

That the prices to be paid for armor under Secretary Whitney's contract with the Bethlehem Iron Company of June 1, 1887, were from $500 to $650 per ton; and the prices to be paid under Secretary Tracy's contract with the Carnegie Steel Company of November 20, 1890, were the same; and like prices were to be paid for armor under subsequent contracts made by Secretary Tracy with the Carnegie Steel Company)bruary 28, 1893, and with the Bethlehem Iron C uy on March

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PRICES OF ARMOR FOR NAVAL VESSELS.

INVESTIGATION BY THE COMMITTEE ON NAVAL AFFAIRS OF THE UNITED STATES SENATE IN RELATION TO THE PRICES PAID FOR ARMOR FOR VESSELS OF THE NAVY.

WASHINGTON, D. C., *January 8, 1896.*

The committee met at 11 o'clock a. m.

Present: Senators CAMERON (chairman), HALE, PERKINS, MCMILLAN, CHANDLER, BACON, and TILLMAN.

The CHAIRMAN. The committee is about to enter upon the inquiry which the Senate directed should be made by a resolution agreed to December 31, 1895. The resolution read as follows:

Resolved, That the Committee on Naval Affairs be directed to inquire whether the prices paid, or agreed to be paid for armor for vessels of the Navy have been fair and reasonable; also, whether any prices paid have been increased on account of patent processes used for the introduction of nickel, or for cementation by the Harvey process; and if so, whether the increases in price are fair and reasonable; whether the issuance of any of the patents was expedited at the request of the Navy Department; whether such patents were properly issued and were for inventions not previously known or used, and who were and are the owners of such patents; whether any officers of the Government were interested therein, or at the time when any contracts were made were, or have since been, interested in the patents or employed by the owners thereof, and whether any legislation is necessary to further promote the manufacture and cheapen the price of armor for vessels of the Navy.

It was ordered that the chairman transmit to the Secretary of the Navy the resolution of the Senate and the following memorandum, with the request to examine them and inform the committee whether it would be his pleasure to appear before the committee at some convenient time and give the information desired.

The memorandum transmitted in pursuance of the above order is as follows:

MEMORANDUM FOR SENATOR CAMERON, CHAIRMAN OF THE SENATE NAVAL COMMITTEE.

The following suggestions are made in reference to the investigation to be conducted by the committee under the resolution of the Senate adopted December 31, 1895:

(1) That the inclosed memorandum be submitted to the Secretary of the Navy with the request that he will, if disposed to appear before the committee, prepare himself to give all available information within the Department or within his knowledge concerning the four points of the memorandum. The following particulars are suggested in connection with or addition to the points of the memorandum as to which it will be desirable to interrogate him when he comes before the committee.

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(10) What are the additional amounts likely to be paid out to fulfill existing contracts, and to what amount is the Department now authorized to make further contracts for armor.

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WM. E. CHANDLER.

JANUARY 4, 1896.

STATEMENTS REQUIRING INVESTIGATION IN CONNECTION WITH THE ARMOR CONTRACTS OF THE NAVY DEPARTMENT.

I.

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1, 1893, and that these prices are too high, as proved by the fact that the Bethlehem Iron Company has recently made contracts with the Russian Government to furnish similar armor at a price understood to be about $300 per ton.

II.

That the contract of Secretary Whitney required the Bethlehem Iron Company to pay all royalties to patentees of processes necessary to be used in making the armor, and that the company did so pay large sums of money to patentees of the nickel steel process, while in the contract of Secretary Tracy with the Carnegie Steel Company of November 20, 1890, it is provided that there shall be a fund amounting to the sum of 2 cents per pound of armor made with which to contest the legality of the nickel steel patents or to pay any amount which the patentees may recover, but that Secretary Tracy agreed that the Government should pay this sum of 2 cents per pound in addition to the prices paid for the armor, although the Bethlehem Iron Company pay the royalties out of the prices received by them for the armor.

III.

That one Hayward A. Harvey had a patent issued on January 10, 1888, for hardening armor plate, and that on April 1, 1891, he filed an application for a patent, on a modification of the process, which on June 11, 1891, was rejected because prior patents covered "the well-known step of hardening by chilling." On June 17, 1891, the application of April 1 was canceled and a new one filed. On June 20 Secretary Tracy wrote the Secretary of the Interior requesting that the application be made special in the Patent Office. The new patent was issued September 29, 1891. In the summer of 1892 a contract was made by the Navy Department with Harvey for the use of his patent and an additional contract was made with him in the spring of 1893, by which he was to be paid $11.50 per ton on armor treated by the process; and in the contracts of the Navy Department with the Bethlehem Iron Company of March 1, 1893, and the Carnegie Steel Company of February 28, 1893, the Government required the use of the Harvey process, agreed to pay the contractors $100, $78, and $50 per ton, according to the thickness of the armor, as an extra compensation for treating the armor by the process, and assumed all the expense for the royalties to be paid to the Harvey Company on the patents; the expediting of the issue of the Harvey patent, and the adoption of the process, having been, it is suggested, brought about by improper influences.

Specifically, it is stated that Commander William M. Folger, Chief of the Ordnance Bureau in the Navy Department, induced the expediting of the Harvey patent and the adoption of the process in the manufacture of armor, by reason of an understanding that he should be employed by the company organized by Mr. Harvey and have an interest therein; that in January, 1893, after the first contract had been made with the company and after the second contract had been arranged, but before it had been actually executed, he resigned as chief of the Bureau, and while continuing to be a commander in the Navy he accepted employment from the Harvey Company for a salary of $5,000 per year and a bonus of 200 shares of stock in the company and went abroad to negotiate contracts with foreign Governments for the use of the Harvey process.

At 12 o'clock m. the committee adjourned.

COMMITTEE ON NAVAL AFFAIRS,
UNITED STATES SENATE,
Saturday, January 18, 1896.

The committee met at 11 o'clock a. m.

Present: Senators Cameron (chairman), Hale, Perkins, McMillan, Chandler, Gibson, Smith, Bacon, and Tillman.

Hon. H. A. Herbert, Secretary of the Navy, appeared.

The CHAIRMAN. Mr. Secretary, we have sent you a memorandum of questions. If you desire to make a statement we would be glad to hear you.

Secretary HERBERT. Shall I proceed to answer the questions furnished, or do the members of the committee prefer to ask questions.

The CHAIRMAN. It would be better to take up the questions in the order that they appear in the memorandum, and after a question has been answered any further questions can be asked that any member of the committee may desire.

STATEMENT OF HON. H. A. HERBERT, SECRETARY OF THE NAVY.

Secretary HERBERT. The memorandum sent to me proceeds as follows:

"The following suggestions are made in reference to the investigation to be conducted by the committee under the resolution of the Senate adopted December 31, 1895:

"(1) That the inclosed memorandum be submitted to the Secretary of the Navy, with the request that he will, if disposed to appear before the committee, prepare himself to give all available information within the Department or within his knowledge concerning the four points of the memorandum. The following particulars are suggested in connection with or addition to the points of the memorandum as to which it will be desirable to interrogate him when he comes before the committee.

"(2) What reason, if any, can be discovered why Secretary Tracy provided the fund of 2 cents per pound of armor made under the contract of the Carnegie Steel Company in addition to the prices paid for the armor, when the Bethlehem Iron Company paid the royalties out of the prices received by them for armor?"

The records of the Department do not disclose any reason for the difference inquired about here. I find on investigation that the contract which was made by Secretary Whitney in 1887 with the Bethlehem Company for the manufacture of armor, provided that the armor should be manufactured on what I may call, for the sake of convenience, the basis of $500 a ton. There were differences in the price of the armor according as it was more or less difficult to manufacture. Small and thin pieces like gun sponsons were allowed a higher price. Thick, heavy armor was at the rate of $500 a ton.

Senator HALE. Have you brought a copy of the contracts?

Secretary HERBERT. I have the contracts here. The first contract was made by Secretary Whitney. Afterwards, in 1890, Secretary Tracy made a contract with the Carnegie Company by which he agreed to pay to that company the same prices that were paid by the Bethlehem Company, with the exception of this point of 2 cents per pound additional inquired about. The Bethlehem Company is understood to have had some contract originally with the Schneider Company, at Creuzot, France, for the right to use the processes that were used by that French company, and this patent is now claimed by that company,

I think. The patent, however, was taken out, as I understand it, after 1887. When Secretary Tracy made the contract with the Carnegie Company he agreed to indemnify it against damages that might be recovered from them for the use of this patent. He seems to have thought the patent invalid.

The CHAIRMAN. The French patent?

Secretary HERBERT. The French patent.

Senator SMITH. That was in addition to the amount paid to the Bethlehem Company?

Secretary HERBERT. Yes; the amount they were claiming was about 2 cents per pound, which would be some $48.80 a ton—a long ton. Long tons are always used in these contracts.

Senator BACON. You mean the amount the French company were claiming?

Secretary HERBERT. The amount the French people were claiming for the use of the patent right which they claimed, and which Secretary Tracy seems to have thought they did not have a right to. At any rate, whatever he thought about it, he agreed in this contract with the Carnegie Company to set aside 2 cents per pound as a fund to be drawn upon to indemnify them in case of any suit coming against them for this patent. His reasons do not appear in the record.

Senator SMITH. Was that 2 cents a pound taken off the price which was agreed upon under the contract?

Secretary HERBERT. No, sir.

Senator SMITH. That was additional?

Secretary HERBERT. It was additional.

Senator HALE. It was to indemnify them.

Secretary HERBERT. It was to indemnify them against a claim of that kind, which he asserted they had no right to, and he agreed to indemnify the Carnegie Company against any suit for infringement.

The fund, however, never was set aside. I think before I came into the office it was decided, in the preceding February, by the Treasury Department, that there was no power in the Secretary of the Navy to order that fund set aside. But the Government was nevertheless responsible under the contract. Secretary Tracy's idea of course was to get an additional plant for the manufacture of armor.

Senator CHANDLER. The amount claimed on the 2 cents per pound is about $300,000 for work done up to this time? The fund which the Comptroller declines to allow to be set aside and paid over is about $300,000, is it not?

Secretary HERBERT. I think so. The Comptroller has simply refused to allow it to be set aside. As to whether it is to be paid depends upon the result of the suit now pending.

Senator HALE. Has any order ever issued from the Department, or has any decision been made by any Secretary directing that sum to be paid?

Secretary HERBERT. No, sir.

Senator HALE. Of course it never has been paid.

Secretary HERBERT. Mr. Tracy refused to pay it, and I have refused to pay it. Suit has been finally brought against the Carnegie Company by the Schneider Company, and I have, through the Attorney-General, employed Mr. Wetmore, an attorney of New York, one of the first patent lawyers in the country, to aid the attorneys of the Carnegie Company in defending the suit.

Senator SMITH. Who are the attorneys of the Carnegie Company?

Secretary HERBERT. Their standing attorneys? I do not now

remember their names. I have met them, but do not remember the names just now. But Mr. Wetmore is defending the Government in that suit.

Senator CHANDLER. Has the Government any other counsel employed?

Secretary HERBERT. None except Mr. Wetmore.

Senator CHANDLER. Is not ex-Secretary Tracy's firm employed?

Secretary HERBERT. Yes; by the Carnegie Company.

Senator CHANDLER. You have also employed Mr. Wetmore?

Secretary HERBERT. Yes, sir.

Senator HALE. To resist the suit?

Secretary HERBERT. To resist the suit. I did not know that ex-Secretary Tracy's firm had been employed by the Carnegie Company until recently. Before this investigation came up I wrote to ex-Secretary Tracy to ascertain from him the grounds upon which he had refused to admit the validity of the French patent, and then I learned that his firm was engaged by the Carnegie Company to defend this suit. The regular attorneys of the Carnegie Company—I do not now remember their names—are defending the suit, and Mr. Tracy's firm is also in the defense. Mr. Wetmore is the only counsel employed by the Government.

Senator HALE. What is there in the records of the Departments on which, if the suit is decided against the Carnegies, the foreign company can maintain and collect this royalty from them? What is there that would lead any Secretary or any Administration now to recognize the obligation to make this good?

Secretary HERBERT. The contract between the Carnegie Company and Mr. Tracy, the Secretary of the Navy.

Senator HALE. The contract recognizes that obligation?

Secretary HERBERT. It recognizes that obligation in these terms in the contract of November 20, 1890:

"Whereas certain patentees claim by reason of their inventions to control the right to make armor plate containing nickel; and

"Whereas the party of the second part (the Navy Department) declines to recognize the claims of said patentees, and to pay the royalty demanded by them, said royalty being 2 cents per pound upon finished armor plates and appurtenances:

"Therefore, for the protection of the party of the first part (the Carnegie Steel Company), there shall be added to the cost of the said nickel steel armor plates and appurtenances, when computed as aforesaid, the sum of 2 cents per pound to cover said claims, which sum the party of the second part (the Navy Department) agrees to pay from time to time, as the payments for said nickel steel armor plates and appurtenances are made, according to this contract. Said sums as paid are to be deposited by the party of the first part in such depositories of the United States as the Secretary of the Navy may designate.

"Should it finally be decided by the courts of competent jurisdiction that the said patents are invalid, or that there is no valid claim against either of the parties hereto, their agents or employees, said fund shall be promptly paid over by the party of the first part to the Secretary of the Treasury, after deducting therefrom such reasonable counsel fees and expenses, if any, as may be approved by the Secretary of the Navy, incurred by the party of the first part in defense of such litigation; or in case of amicable settlement between the parties hereto and said patentees, the balance remaining after such settlement, and payment of expenses as aforesaid, which may have been necessarily incurred

by the party of the first part, shall be paid over to said Secretary of the Treasury.

"In case of a final judgment in favor of said patentees, the said fund shall be used, so far as necessary, for the payment of said judgment, and costs and expenses approved as aforesaid, including reasonable attorneys' fees, but in case all of said fund shall be required for the payment of said judgment, then the party of the second part shall pay such expenses as shall have been properly incurred by the party of the first part, after approval as aforesaid, including reasonable attorneys' fees, in the defense of any such suits."

Then there are other provisions on the same subject, but these I have read sufficiently show, I suppose, the liability of the Government.

Senator CHANDLER. Then if 2 cents is not enough to pay the expenses and royalties the Government pays the rest?

Secretary HERBERT. Yes.

Senator HALE. It makes them good?

Secretary HERBERT. The Government is the guarantor in that case.

Senator HALE. That shows the Secretary contemplated litigation, and he provided, I understand, for the segregating of this fund, which has never been paid over by anybody, nor any portion of it, but is now locked up by the Comptroller, and the suit is now pending. That is the real situation, is it not?

Secretary HERBERT. The Comptroller refuses to set it aside, I understand. It has never been set aside and this contract simply stands.

Senator CHANDLER. Did the formal requisition for the payment of the 2 cents per pound go from the Navy Department to the Comptroller to pay the sum?

Secretary HERBERT. I think it did. I understand he refused to set it aside.

Senator CHANDLER. He could not make the refusal until the motion to pay had originated in the Navy Department?

Secretary HERBERT. I am not sure about what action was taken by the Department.

Senator CHANDLER. Therefore the Secretary of the Navy, for the time being, must have undertaken to pay 2 cents a pound?

Secretary HERBERT. Before saying that the formal requisition was made I would prefer to consult the records and see whether that was done; but my understanding is that either upon a formal requisition or upon an informal letter, which we sometimes send over from the Department to the Treasury to know whether a thing will be allowed or not, the Treasury Department refused, and therefore the fund has never been set aside.

Senator CHANDLER. I understand that to be the case. No money is appropriated for naval services and none can be paid out except under the direction of the Secretary of the Navy?

Secretary HERBERT. No, sir.

Senator CHANDLER. Therefore, if the Comptroller stopped a requisition for this payment he must have stopped the request of the Secretary of the Navy that it should be paid?

Secretary HERBERT. Not necessarily. There might have been a letter written and sent over to know whether he could do it.

Senator HALE. A letter of inquiry?

Secretary HERBERT. A letter of inquiry.

Senator CHANDLER. You do not know how that was?

Secretary HERBERT. I do not know how that was.

Senator HALE. You will furnish that record?

Secretary HERBERT. I will furnish it.

Let me say here that a proposition to compromise this suit was made to me some time ago through Mr. Leishman, the manager of the Carnegie Company. He said a proposition had been made to the Carnegie Company to compromise, and wanted to know if I would accept it. The proposition was not very definite, but Mr. Leishman thought it could be accepted with advantage. I wrote to Mr. Wetmore and told him that I would make no compromise at all except upon his advice. The substance of my letter was the expression of a wish that he should examine the case very carefully before making any recommendation; that I was indisposed to make any compromise, but would hear from him on the subject. He has never advised any compromise, and the suit is pending.

Senator BACON. I wish to ask the Secretary if the two contracts, the one with the Carnegie Company and the one with the Bethlehem Company, were the same, except as to the 2 cents a pound provision.

Secretary HERBERT. I understand they were the same.

Senator BACON. They contemplated the same kind of armor and at the same prices?

Secretary HERBERT. Yes, sir.

Senator BACON. And the only difference was that in the case of the Carnegie Company there was a provision made to guarantee against loss by reason of this French claim, and in the case of the Bethlehem Company there was no such provision? In all other respects as to prices, materials, and everything else the contracts were the same?

Secretary HERBERT. Yes, sir; that is my understanding.

Senator MCMILLAN. How did the Bethlehem Company settle with the French people for this patent?

Secretary HERBERT. That is not known. They made some contract, which they have not made known to the Department, originally with the Schneider Company in France for the use of their processes. That contract must have had in it some prospective clause that looked to the use of any future invention that the Creusot Company might adopt; at least, I suppose so. There has never been any claim on the part of the Bethlehem Company, at least, against the Government for any indemnity of that kind. This incorporating of nickel with armor was adopted after the contract of 1887 and after the Schneider Company had made their contract with the Bethlehem Company.

Senator BACON. What was the difference in time, if any, in the making of those two contracts?

Secretary HERBERT. One was made in June, 1887, and the other in 1890. I have copies here that give the exact date.

Senator BACON. With whom was the first contract made?

Secretary HERBERT. With the Bethlehem Company in 1887, and that was made by Secretary Whitney.

Senator BACON. The Bethlehem Company contract, in which this provision is not contained, was the first one made?

Secretary HERBERT. Yes, sir.

Senator HALE. Let copies of those contracts be inserted at this point.

The contracts referred to are as follows:

"CONTRACT FOR STEEL ARMOR PLATES.

"This contract, of two parts, made and concluded this first day of June, A. D. 1887, by and between The Bethlehem Iron Company, a corporation created under the laws of the State of Pennsylvania, and

doing business at South Bethlehem, in said State, represented by Alfred Hunt, president of said company, parties of the first part, and The United States, represented by William C. Whitney, Secretary of the Navy, party of the second part, witnesseth, That, for and in consideration of the payments hereinafter specified, the partiies of the first part, for themselves and their successors, heirs, and ass gns, and their and each of their personal and legal representatives, do hereby jointly and severally covenant and agree to and with the United States as follows, that is to say:

"*First.* That, within two and a half years from and after the date of this contract, the parties of the first part will, at their own risk and expense, provide and establish, at South Bethlehem, in the county of Northampton and State of Pennsylvania, a suitable 'plant,' with all necessary appliances and appurtenances, in all respects complete and adequate to the production of the steel armor plates and appurtenances required under this contract, and to deliveries thereof within the periods hereinafter prescribed; it being understood that the United States shall not, by reason of this contract or anything herein contained, acquire or possess any ownership or proprietary interest whatever of, in, or to such 'plant,' appliances, and appurtenances, or any part thereof; it being further expressly understood and agreed, by and between the parties to this contract, that the Secretary of the Navy may appoint suitable inspectors, who shall, at all times during the preparation of such 'plant,' be furnished by the contractors with full information respecting the character and progress of the work in the preparation of said 'plant,' and such access to the premises as shall enable the Department, from time to time, upon special order of the Chief of the Bureau of Ordnance, to verify the correctness of such information.

"*Second.* The parties of the first part will, at their own risk and expense, manufacture and deliver to the Navy Department, in the manner and within the periods prescribed, and according to the conditions stated in the advertisement of the Secretary of the Navy, dated August 21, 1886, inviting proposals for steel armor plates; the proposal of the parties of the first part under said advertisement; the printed circular (including the drawings appended to and forming part thereof), approved by the Secretary of the Navy February 12, 1887; the addenda thereto approved by the Secretary of the Navy March 11, 1887, and the notice by the Secretary of the Navy, dated March 16, 1887; which advertisement, proposal, circular, addenda, and notice, hereto annexed, shall be deemed and taken as forming part of this contract, with the like operation and effect as if the same were incorporated herein; the steel armor plates and appurtenances therein described or referred to, and at the prices per ton for the different exhibits, and for the total price, as follows:

Exhibit.	Kind of material.	Estimated number of tons in each exhibit.	Price per ton for each exhibit.	Price for each exhibit.
Column 1.	Column 2.	Column 3.	Column 4.	Col. 5 = col. 3 × 4.
K.	Side armor for Puritan	734.7	$510.00	$374,697.00
L.	Side armor for Amphitrite and class	1066.8	510.00	544,068.00
M.	Turrets and pilot houses for 4 monitors	835.8	575.00	480,585.00
N.	Smoke pipes and ventilators for 4 monitors	266.3	575.00	153,122.50
O.	Armor for breastworks for 2 armored vessels	680.0	575.00	391,000.00
P.	Armor for turrets, conning towers, and ammunition tubes for 2 armored vessels	485.0	575.00	278,875.00

Exhibit.	Kind of material.	Estimated number of tons in each exhibit.	Price per ton for each exhibit.	Price for each exhibit.
Column 1.	Column 2.	Column 3.	Column 4.	Col. 5 = col. 3 × 4.
Q.	Part of side armor for 2 armored vessels	364.0	$500.00	$182,000.00
R.	Part of side armor for 2 armored vessels	468.0	525.00	245,700.00
S.	Part of side armor for 2 armored vessels	272.0	600.00	163,200.00
T.	Part of side armor for 2 armored vessels	196.0	600.00	117,600.00
U.	Rolled plates, protective deck armor, and gun shields	1135.0	490.00	556,150.00
V.	Turret and side armor bolts and steel accessories	181.0	650.00	117,650.00
W.	Small armor bolts, steel	6.0	650.00	3,900.00
X.	Tubing and washers, wrought iron	12.0	180.00	2,160.00
	Total price			3,610,707.50

The quantities and weights named in column 3 constitute the estimated weights which will be required by the party of the second part under this contract.

"Subject, however, to such variations in said total price, and in the weights, and in the aggregate weight of said armor plates and appurtenances as may result from changes which may be made under provisions in the aforesaid circular, addenda, and notice, relating to changes, or from the operation of other conditions therein contained which may affect the total price or weights or aggregate weight aforesaid: *Provided, however*, That the aggregate weight of the armor plates and appurtenances to be delivered under this contract shall be finally determined in accordance with the several provisions and conditions relating thereto contained in the aforesaid circular, addenda, and notice; such armor plates and appurtenances to be of domestic manufacture, and to conform to and with all the details, requirements, and stipulations relating to material, manufacture, tests, inspection, and delivery, and in all respects to the conditions stated in the aforesaid circular, the addenda thereto, and notice; it being expressly understood, covenanted, and agreed, by and between the parties to this contract, that deliveries thereunder shall be commenced by the delivery of not less than (300) three hundred tons within two months from and after the expiration of the contract time for the completion of an adequate 'plant,' and shall be continued thereafter at the rate of not less than (300) three hundred tons per month, and shall be fully completed within two years from the date of such first delivery.

"*Third.* It is mutually understood, covenanted, and agreed, by and between the parties to this contract, that changes in the conditions or requirements of the circular, addenda, and notice, hereinbefore referred to, and which form part of this contract, may be made by and with the mutual consent of the parties hereto; and if changes are thus made, the actual cost thereof and the damage, if any, caused thereby, and the amount of the increased or diminished compensation which the contractors shall be entitled to receive, if any, in consequence of such change or changes, shall be ascertained, estimated, and determined by a board of naval officers to be appointed by the Secretary of the Navy, and the determination of such board, or of a majority thereof, shall be binding upon the parties of the first part, who hereby expressly covenant and agree to accept and abide by such determination.

"*Fourth.* It is further mutually understood, covenanted, and agreed, by and between the parties to this contract, that every reasonable con-

sideration shall be extended to the contractors in case of unavoidable delay in the preparation of the 'plant' or in the manufacture and delivery of the armor plates and appurtenances aforesaid, provided it shall appear that they have assumed the obligations of this contract in good faith and that they are prosecuting the work under the same with due diligence, in which case reasonable extensions of the periods prescribed, for the preparation of the 'plant' or for deliveries of the armor plates and appurtenances required under this contract, shall be granted. In case any delay shall arise in the prosecution of the work required under this contract, or any part thereof, or in case any question shall arise under the provisions hereof concerning premiums, such questions, with all the facts relating thereto, shall be submitted to the Secretary of the Navy for consideration, and his decision thereon shall be conclusive and binding upon all the parties to this contract.

"*Fifth.* It is further mutually understood, covenanted, and agreed, that if, at any stage of the work prior to final completion, the Secretary of the Navy shall find that the contractors are unable to go forward with the work necessary to provide and establish a 'plant' as aforesaid, and to make satisfactory progress towards the completion of the same within the period prescribed as aforesaid, including such extension or extensions thereof, if any, as may have been granted under the fourth clause of this contract, then and in such case it shall be optional with the Secretary of the Navy to declare this contract forfeited on the part of the contractors.

"*Sixth.* It is further mutually understood, covenanted, and agreed, that if, after the completion of the 'plant' aforesaid, and at any stage of the work prior to the final completion of said armor plates and appurtenances, the Secretary of the Navy shall find that the contractors are unable to proceed with, and make satisfactory progress in, the manufacture and delivery of the armor plates and appurtenances required, and within the periods prescribed, as aforesaid, including such extension or extensions thereof, if any, as may have been granted under the fourth clause of this contract, then and in such case it shall be optional with the Secretary of the Navy to declare this contract forfeited on the part of the contractors; and in case the Secretary of the Navy shall, under the provisions of this or of the next preceding clause, declare this contract forfeited, such forfeiture shall not affect the right of the United States to recover, for defaults which may have occurred under this contract, and as liquidated damages, a sum of money equal to the penalty of the bond accompanying the same.

"*Seventh.* The parties of the first part, in consideration of the premises, hereby covenant and agree to hold and save the United States harmless from and against all and every demand or demands of any nature or kind for or on account of the adoption of any plan, model, design, or suggestion, or for or on account of the use of any patented invention, article, or appliance, which has been or may be adopted or used in or about the manufacture or production of said armor plates and appurtenances, or any part thereof, under this contract, by the parties of the first part, and to protect and discharge the Government from all liability on account thereof, by proper releases from patentees or otherwise, and to the satisfaction of the Secretary of the Navy, before final payment under this contract shall be made.

"*Eighth.* It is mutually understood, covenanted, and agreed by and between the respective parties that this contract shall not, nor shall any interest therein, be transferred by the parties of the first part to any other person or persons, and that any such transfer shall cause the

annulment of this contract so far as the United States are concerned; and that all rights of action to recover for any breach of this contract by the parties of the first part are reserved to the United States.

"*Ninth.* It is hereby mutually and expressly covenanted and agreed, and this contract is upon the express condition, that no Member of or Delegate to Congress, officer of the Navy, or any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this contract or to any benefit to arise therefrom; but this stipulation, so far as it relates to Members of or Delegates to Congress, is not to be construed to extend to this contract, it being made with an incorporated company.

"*Tenth.* The United States, in consideration of the premises, do hereby contract, promise, and engage to and with the parties of the first part as follows:

"1. The contract price to be paid by the United States to the said parties of the first part for armor plates and appurtenances manufactured and delivered under this contract shall be the price per ton for each exhibit as stated in the second clause of this contract.

"2. Payments under this contract shall be regulated and made in accordance with the provisions contained in this contract, and in the circular, addenda, and notice aforesaid.

"3. There shall be a reservation of 10 per cent on each payment made under this contract until the aggregate of such reservations shall reach the sum of one hundred thousand dollars ($100,000), when such reservations, so far as subsequent payments are concerned, shall cease, and the sum last mentioned shall be held as a special reserve under the conditions hereinafter stated.

"4. No payment shall be made except upon bills, in triplicate, certified by the inspectors in such manner as shall be directed by the Secretary of the Navy, whose final approval of all bills thus certified shall be necessary before payment thereof.

"5. All warrants for payments under this contract shall be made payable to the contractors or their order.

"6. The special reserve aforesaid shall be retained until all the armor plates and appurtenances furnished under this contract shall have successfully met the requirements of paragraph 155 of the circular aforesaid; but for the purpose of such responsibility the party of the second part agrees that after eighteen months from the delivery of any plate, if notification of failure of such plate as referred to in said paragraph shall not have been served on the contractor, the responsibility of the contractor for defects shall cease as to such delivery, and no portion of said reserve shall thereafter be held for such delivery.

"7. When all the conditions, covenants, and provisions of this contract shall have been performed and fulfilled by and on the part of the contractors, they shall be entitled, within ten days after the filing and acceptance of their claim, to receive the said special reserve or so much thereof as they may be entitled to, on the execution of a final release to the United States, in such form as shall be approved by the Secretary of the Navy, of all claims of any kind or description under or by virtue of this contract.

"*Eleventh.* If any doubts or disputes arise as to the meaning of anything in the circular, addenda, or notice aforesaid, or if any discrepancy appear between the same and this contract, the matter shall be at once referred to the Secretary of the Navy for determination, and the parties of the first part hereby bind themselves and their successors, heirs, and assigns, and their and each of their personal and legal representa-

tives, to abide by his decision in the premises. If, however, the parties of the first part shall feel aggrieved at any decision of the Secretary of the Navy, they shall have the right to submit the same to the President of the United States, and his decision shall control.

"In witness whereof the respective parties have hereunto set their hands and seals the day and year first above written.

"Signed and sealed in the presence of—

"_____ _____ [L. S.]
"_____ _____ [L. S.]
"_____ _____ [L. S.]
"_____ _____ [L. S.]
"_____ _____ [L. S.]
"_____ _____" [L. S.]

"CONTRACT FOR STEEL ARMOR PLATES AND APPURTENANCES.

"This contract, of two parts, made and concluded this twentieth day of November, A. D. 1890, by and between Carnegie, Phipps & Company, Limited, a limited partnership association, organized under the laws of the State of Pennsylvania, and doing business in the county of Allegheny, in said State, represented by William L. Abbott, chairman, and Henry M. Curry, a manager, and John G. A. Leishman, a manager, of said association, party of the first part, and the United States, represented by the Secretary of the Navy, party of the second part, Witnesseth, That for, and in consideration of, the payments hereinafter specified, the party of the first part, for itself, and its successors, heirs, and assigns, and its legal representatives, does hereby covenant and agree to and with the United States, as follows, that is to say:

"*First.* The party of the first part will, at its own risk and expense, manufacture and deliver to the Navy Department, in the manner, within the periods prescribed, and according to the conditions stated herein and in the printed circular (including the drawings appended to and forming part thereof) approved by the Secretary of the Navy, February 12, 1887, and the addenda thereto approved by the Secretary of the Navy, March 11, 1887, and November 20, 1890—which circular and addenda, hereto annexed, shall be deemed and taken as forming part of this contract, with the like operation and effect as if the same were incorporated herein, except as hereinafter provided—six thousand (6,000) tons of steel armor plates and appurtenances, the armor plates to be of thicknesses from four to twenty inches, both inclusive, at the prices per ton for the different exhibits as stated in the second clause of this contract, free on board cars at the works of the party of the first part.

"Such armor plates and appurtenances to be of domestic manufacture, and to conform to and with all the details, requirements, and stipulations relating to material, manufacture, tests, inspection, and delivery, and in all respects to the conditions stated in the aforesaid circular and addenda thereto, except as hereinafter provided, it being expressly understood, covenanted, and agreed by and between the parties to this contract that deliveries thereunder shall be commenced by the delivery of not less than three hundred (300) tons on or before July 1, 1891, and shall be continued thereafter at the rate of not less than five hundred (500) tons per month until the delivery of the six thousand (6,000) tons aforementioned is completed, which shall be within eleven months and fifteen days from the date last above mentioned.

"*Second.* It is further mutually understood, covenanted, and agreed that the party of the second part shall, from time to time, order from the party of the first part, and furnish such description and drawings thereof as may be necessary, such quantities of armor plates and appurtenances as shall be required, so that the aggregate of such orders shall equal the amount of armor plates and appurtenances herein contracted for, to wit, six thousand (6,000) tons, and such orders shall be given from time to time, but for each of such orders given after June 1, 1891, the party of the first part will be allowed ninety (90) days from the date of said order in which to commence deliveries thereunder.

"The prices per ton to be paid to the party of the first part for the armor plates and appurtenances above mentioned shall be the different prices per ton that would be paid therefor under the provisions of a certain contract for armor plates and appurtenances made and concluded the first day of June, A. D. 1887, by and between the Bethlehem Iron Company, of South Bethlehem, Pennsylvania, and the Secretary of the Navy; and the prices per ton above mentioned, which shall be paid for the armor plates and appurtenances ordered under this contract, shall be determined as follows:

"When an order is given to the party of the first part for armor plates or appurtenances, the Secretary of the Navy will cause a board of naval officers, appointed by the Secretary of the Navy, to determine under which exhibit or exhibits of the said contract with the Bethlehem Iron Company the articles thus ordered should be classed, and the said board shall assign the articles thus ordered to "Exhibits," in such a way that the prices per ton to be paid to the party of the first part, by reason of such assignment, shall be the prices per ton that would be paid therefor under the said contract with the Bethlehem Iron Company for the articles ordered as aforesaid. If any articles are ordered which, in the opinion of the board, can not be assigned as aforesaid, it will so state.

"The prices per ton, determined as above mentioned, will be stated by the Department at the time of giving said orders to the party of the first part. If the party of the first part considers that the armor plates and appurtenances thus ordered have been incorrectly assigned to the different exhibits, and that consequently the prices as stated by the Department are incorrect, it will so inform the Department in writing, within ten days of the date of receipt of said order, and before the manufacture of the articles in question begins. In this case the matter will be promptly referred by the Secretary of the Navy to the board which made the assignment thus objected to by the party of the first part, or to another board, similarly constituted, which board will finally determine under which exhibit or exhibits the said armor plates and appurtenances shall be classed.

"*Third.* It is further mutually understood, covenanted, and agreed, that the ballistic test for acceptance under this contract for armor plates under six (6) inches in thickness, and for those over thirteen (13) inches in thickness, shall be fixed and determined by a board of naval officers, to be appointed by the Secretary of the Navy, in such a manner that the ballistic test thus determined shall be, as far as practicable, of the same relative severity for the plates of the thicknesses above mentioned, as is required in the aforesaid contract with the Bethlehem Iron Company for plates of thicknesses between six (6) and thirteen (13) inches, both inclusive.

"*Fourth.* It is further mutually understood, covenanted, and agreed, by and between the parties to this contract, that the Secretary of the

Navy may require all or part of the armor plates and appurtenances herein contracted for to be made of ordinary steel or of nickel steel. If nickel-steel armor plates or appurtenances are thus furnished, the prices per ton that shall be paid therefor shall be the prices per ton before mentioned for similar articles of ordinary steel, made in accordance with the requirements of the circular and addenda thereto, which form part of this contract, said prices being increased or diminished by the greater or less cost of labor and materials only to the party of the first part in the production of the nickel-steel armor plates and appurtenances ordered, as compared with the cost of labor and materials only to the party of the first part in the production of similar articles made of ordinary steel, as above mentioned; the intention being, that while the party of the second part shall have the fullest power to vary the requirements of this contract from ordinary steel armor plates and appurtenances, such as are herein specified, to nickel-steel armor plates and appurtenances, either in whole or in part, this contract shall, nevertheless, continue to exist on the basis of ordinary steel armor plates and appurtenances as aforementioned, modified only in this respect, viz: that additional cost and expense, as aforesaid, occasioned to the party of the first part by such modification, shall be paid to the party of the first part, and that any saving, as aforesaid, thereby occasioned, shall be deducted from the contract price, so that in the end the party of the first part shall be neither advantaged nor disadvantaged as aforesaid under this contract by the ordering of said nickel-steel armor plates or appurtenances, instead of said ordinary steel armor plates or appurtenances; but the cost above mentioned shall not be construed to include the cost of such armor plates and appurtenances as fail to pass the ballistic and other tests and inspections under the rules that may be established by the boards herein provided for, or that may not be presented for such tests and inspections.

"The amount of increased or diminished compensation, as aforesaid, if any, that the party of the first part shall be entitled to receive for furnishing nickel-steel armor plates and appurtenances, as compared with that which would be paid for similar articles made of ordinary steel under the provisions of this contract, shall be ascertained, estimated, and determined by a board of naval officers to be appointed by the Secretary of the Navy. Every facility will be given by the party of the first part to the aforesaid board, or to other persons appointed by the Secretary of the Navy for the purpose, in obtaining all necessary information as to the comparative cost only above mentioned. All information thus obtained will be considered strictly confidential.

"In case any charges on account of royalties, guarantees, etc., are included in the cost of manufacture of the nickel-steel armor plates and appurtenances aforementioned, the agreements of the party of the first part, in consequence of which the said charges are made, must be first approved by the Secretary of the Navy.

"Whereas certain patentees claim by reason of their inventions to control the right to make armor plate containing nickel; and

"Whereas the party of the second part declines to recognize the claims of said patentees, and to pay the royalty demanded by them, said royalty being two (2) cents per pound upon finished armor plates and appurtenances:

"Therefore, for the protection of the party of the first part, there shall be added to the cost of the said nickel-steel armor plates and appurtenances, when computed as aforesaid, the sum of two (2) cents per pound to cover said claims, which sum the party of the second part

agrees to pay from time to time, as the payments for said nickel-steel armor plates and appurtenances are made, according to this contract. Said sums as paid are to be deposited by the party of the first part in such depositories of the United States as the Secretary of the Navy may designate.

"Should it finally be decided by the courts of competent jurisdiction that the said patents are invalid, or that there is no valid claim against either of the parties hereto, their agents, or employés, said fund shall be promptly paid over by the party of the first part to the Secretary of the Treasury, after deducting therefrom such reasonable counsel fees and expenses, if any, as may be approved by the Secretary of the Navy, incurred by the party of the first part in defense of such litigation; or in case of amicable settlement between the parties hereto and said patentees, the balance remaining after such settlement and payment of expenses as aforesaid which may have been necessarily incurred by the party of the first part, shall be paid over to said Secretary of the Treasury.

"In case of a final judgment in favor of said patentees, the said fund shall be used, so far as necessary, for the payment of said judgment, and costs and expenses approved as aforesaid, including reasonable attorneys' fees, but in case all of said fund shall be required for the payment of said judgment, then the party of the second part shall pay such expenses as shall have been properly incurred by the party of the first part, after approval as aforesaid, including reasonable attorneys' fees, in the defense of any such suits.

"It shall be the further duty of said board, or of a board similarly constituted, to determine and fix the physical, chemical, and other tests and requirements for said nickel-steel armor plates and appurtenances, and the preliminary and final ballistic tests for acceptance therefor, and also the rights to earn premiums for ballistic resistance in excess of that required by said ballistic tests for acceptance.

"The party of the first part shall have the right to appeal from the finding of the said board with reference to the tests for acceptance of nickel-steel armor plates and appurtenances, and also with reference to the said premiums, to another board composed of three persons, and constituted as follows, viz: One member to be nominated by each of the parties to this contract, and the third member to be chosen by the two first mentioned.

"The finding of the board last mentioned, or a majority thereof, shall govern, subject to appeal as hereinafter provided.

"*Fifth.* It is further mutually understood, covenanted, and agreed by and between the parties to this contract, that in case the United States incurs expenses in the purchase, from the party of the first part, of plates and bolts, or either, for experimental purposes in connection with the development of said nickel-steel armor plates or appurtenances, that the cost of said plates and bolts shall be deducted from any premiums that the party of the first part may earn on nickel-steel armor plates, as stated in the preceding clause, for ballistic resistance.

"*Sixth.* It is further mutually understood, covenanted, and agreed, by and between the parties to this contract, that changes in the conditions or requirements of the circular and addenda, hereinbefore referred to, and which form a part of this contract, may be made by and with the mutual consent of the parties hereto, and that if changes are thus made the actual cost thereof and the damage, if any, caused thereby, and the amount of the increased or diminished compensation which the party of the first part shall be entitled to receive, if any, in consequence

of such change or changes, shall be ascertained, estimated, and determined by a board of naval officers to be appointed by the Secretary of the Navy.

"*Seventh.* Both the parties to this contract shall have the right to appear before the board or boards herein provided for, either in person or by representatives, and to make such statements, written or oral, as they may see fit concerning the matters with which said board or boards may be charged; and said board or boards will duly consider such statements. In each case a decision of a majority of the board shall govern, and both parties to this contract hereby expressly covenant and agree to abide by said decision, subject, however, to appeal to the President of the United States, and his decision shall control.

"*Eighth.* It is further mutually understood, covenanted, and agreed, by and between the parties to this contract, that every reasonable consideration shall be extended to the party of the first part, in case of unavoidable delay in the manufacture and delivery of the armor plates and appurtenances aforesaid, provided it shall appear that said party has assumed the obligations of this contract in good faith, and that it is prosecuting the work under the same with due diligence, in which case reasonable extensions of the periods prescribed for deliveries of the armor plates and appurtenances required under this contract shall be granted. In case any delay shall arise in the prosecution of the work required under this contract or any part thereof, or in case any question shall arise under the provisions hereof concerning premiums, such questions, with all the facts relating thereto, shall be submitted to the Secretary of the Navy for consideration, and his decision thereon shall be conclusive and binding upon the parties to this contract.

"*Ninth.* It is further mutually understood, covenanted, and agreed that if at any stage of the work prior to the final completion of said armor plates and appurtenances the Secretary of the Navy shall find that the party of the first part is unable to proceed with and make satisfactory progress in the manufacture and delivery of the armor plates and appurtenances required, and within the periods prescribed as aforesaid, including such extension or extensions thereof, if any, as may have been granted under the eighth clause of this contract, then and in such case it shall be optional with the Secretary of the Navy to declare this contract forfeited on the part of the party of the first part; and in case the Secretary of the Navy shall, under the provisions of this clause, declare this contract forfeited, such forfeiture shall not affect the right of the United States to recover for defaults which may have occurred under this contract, and as liquidated damages, a sum of money equal to the penalty of the bond accompanying the same.

"*Tenth.* The party of the first part, in consideration of the premises, hereby covenants and agrees to hold and save the United States harmless from and against all and every demand or demands of any nature or kind for or on account of the adoption of any plan, model, design, or suggestion, or for or on account of the use of any patented invention, article, or appliance which has been or may be adopted or used in or about the manufacture or production of said armor plates or appurtenances, or any part thereof, under this contract, by the party of the first part, and to protect and discharge the United States from all liability on account thereof, or on account of the use thereof, by proper releases from patentees or otherwise, and to the satisfaction of the Secretary of the Navy, before final payment under this contract shall be made, except patents as to nickel-steel armor plates and appurtenances, which are specially provided for in the fourth clause of this contract.

"*Eleventh.* It is further mutually understood, covenanted, and agreed, by and between the respective parties hereto, that this contract shall not, nor shall any interest herein, be transferred by the party of the first part to any other person or persons, and that any such transfer shall cause the annulment of this contract so far as the United States are concerned; and that all rights of action to recover for any breach of this contract by the party of the first part are reserved to the United States.

"*Twelfth.* It is hereby mutually and expressly covenanted and agreed, and this contract is upon the express condition, that no Member of or Delegate to Congress, officer of the Navy, nor any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this contract, or to any benefit to arise therefrom.

"*Thirteenth.* The United States, in consideration of the premises, do hereby contract, promise, and engage to and with the party of the first part, as follows:

"1. The contract prices to be paid by the United States to the said party of the first part for armor plates and appurtenances manufactured and delivered under this contract shall be the prices per ton determined as provided for in the second or in the fourth clause of this contract.

"2. Payments under this contract shall be regulated and made in accordance with the provisions contained in this contract and in the circular and addenda aforesaid.

"3. There shall be a reservation of 10 per cent on each payment made under this contract, until the aggregate of such reservations shall reach the sum of one hundred thousand dollars ($100,000), when such reservations, so far as subsequent payments are concerned, shall cease, and the sum last mentioned shall be held as a special reserve under the conditions hereinafter stated.

"4. No payment shall be made except upon bills, in triplicate, certified by the inspector, in such manner as shall be directed by the Secretary of the Navy, whose final approval of all bills thus certified shall be necessary before payment thereof.

"5. All warrants for payments under this contract shall be made payable to the party of the first part or its order.

"6. The special reserve aforesaid shall be retained until all the armor plates and appurtenances furnished under this contract shall have successfully met the requirements of paragraph 155 of the circular and addenda aforesaid and subsequent modifications thereof, if any; but for the purpose of such responsibility the party of the second part agrees that after eighteen months from the delivery of any plate, if notification of failure of such plate as referred to in said paragraph shall not have been served on the party of the first part, the responsibility of the party of the first part for defects shall cease as to such delivery, and no portion of said reserve shall thereafter be held for such delivery.

"7. When all the conditions, covenants, and provisions of this contract shall have been performed and fulfilled by and on the part of the party of the first part, said party shall be entitled, within ten days after the filing and acceptance of its claim, to receive the said special reserve, or so much thereof as it may be entitled to, on the execution of a final release to the United States, in such form as shall be approved by the Secretary of the Navy, of all claims of any kind or description under or by virtue of this contract.

"*Fourteenth.* If any doubts or disputes arise as to the meaning of anything in the circular and addenda aforesaid, or if any discrepancy appear between the same and this contract, the matter shall be at once referred to the Secretary of the Navy for determination; and the party of the first part hereby binds itself, and its successors, heirs, and assigns, and its legal representatives, to abide by his decision in the premises. If, however, the party of the first part shall feel aggrieved at any decision of the Secretary of the Navy, it shall have the right to submit the same to the President of the United States, and his decision shall control.

"In witness whereof the respective parties have hereunto set their hands and seals, the day and year first above written.

"Signed and sealed in the presence of—

"CARNEGIE, PHIPPS & CO., LIMITED.
"By WM. L. ABBOTT,
"*Chairman.*
"H. M. CURRY,
"*Manager.*
"JOHN G. A. LEISHMAN,
"*Manager.*

"OTIS H. CHILDS,
"*Sec'y.*

{ SEAL OF CARNEGIE, PHIPPS AND COMPANY, LIMITED. }

"THE UNITED STATES.
"By B. F. TRACY,
"*As Secretary of the Navy.*

"WM. B. REMEY,
"*Judge-Advocate-General,*
"As to B. F. TRACY,
"*Secretary of the Navy.*"

{ SEAL OF NAVY DEPARTMENT. }

Senator PERKINS. Did I not understand you to say that the rate upon light armor was less than 2 cents a pound?

Secretary HERBERT. No.

Senator PERKINS. It is the same, regardless of weight of armor?

Secretary HERBERT. The price of armor is greater for small plates and plates that are more difficult to manufacture. There are certain plates the shapes of which it is very difficult to attain.

Senator PERKINS. The royalty was the same, in any event?

Secretary HERBERT. It was not the royalty. I was speaking about the price of armor in these original contracts, which are contracts for the manufacture of the armor. We have not come to the question of royalties yet, except that I have been speaking of the claim of 2 cents per pound royalty on the incorporation of nickel, in so far as it entered into the increased price of armor in the contract of 1890. The two contracts of 1887 and 1890 were contracts for the manufacture of armor, and the 2 cents a pound related to the royalty that is claimed by the Creusot Company for the use of a patent that it claimed for incorporating nickel with steel.

Senator CHANDLER. Let me see if I understand the case. The first contract in 1887 with the Bethlehem Company was to furnish a large quantity of armor at about $500 a ton?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. The Bethlehem Company agreed to indemnify the United States against all patent processes whatever?

Secretary HERBERT. That is right.

Senator CHANDLER. That included the Schneider patent for making nickel steel?

Secretary HERBERT. Yes. The Schneider process for the incorporation of nickel with steel had not been discovered, but still the provision of the contract seems to have been broad enough to cover it without further expense to the Government.

Senator CHANDLER. And when the nickel-steel was introduced the Bethlehem Company were bound to compensate Schneider & Co. for the use of their patent? Do you not understand that the amount paid or to be paid by the Bethlehem Company was from $600,000 to $1,000,000 for the use of these patents?

Secretary HERBERT. I do not know how much they paid. There is nothing on record to show.

Senator CHANDLER. Have you any reason to doubt that there was a very large sum of money paid?

Secretary HERBERT. It was a large sum, I suppose. I do not know what the amount was.

Senator CHANDLER. They adopted it?

Secretary HERBERT. They adopted it and used it like the Carnegie Company.

Senator HALE. They are incorporating nickel?

Secretary HERBERT. They are incorporating nickel.

Senator CHANDLER. When Secretary Tracy, in 1890, made a contract with the Carnegie Company, instead of making the Carnegie Company agree to indemnify against all patent processes, he made an exception in the case of nickel and steel patents, and provided a fund of 2 cents a pound with which to litigate or to pay, as you have already stated?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. Now, instead of deducting the 2 cents a pound from the price of the armor, he provided the 2 cents a pound in addition?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. Those are the facts, as you understand them?

Secretary HERBERT. Those are the facts, as I understand them.

Senator CHANDLER. Which would make the Carnegie Company, if the amount of royalty had to be paid, 2 cents a pound better off on all the armor than the Bethlehem Company?

Secretary HERBERT. Yes, sir; if the Bethlehem Company paid that much.

Senator PERKINS. That is, $44.80 a ton more.

Senator CHANDLER. If the 2 cents a pound had to be paid?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. Do you understand that that was a provision insisted upon by the Department, or by the Carnegie Company?

Secretary HERBERT. I do not know whether it was insisted upon by the Carnegie Company or not. I have understood in a general way that Secretary Tracy found it difficult to make the contract with the Carnegie Company; that they were indisposed to do it. But there is nothing on record to indicate that fact.

Senator CHANDLER. Do you understand that the contract made by the Carnegie Company to transfer to them the making of a large quantity of armor, previously contracted for by the Bethlehem Company, originated with the Carnegie Company or with the Department?

Secretary HERBERT. I do not know with whom it originated.

Senator CHANDLER. Do you see any reason on the face of the subject why the 2 cents a pound should have been provided by the Department instead of being furnished by the Carnegie Company?

Secretary HERBERT. I could see no reason, unless the Carnegie Company insisted on it, and refused to make the contract in any other way. That is a mere supposition.

The CHAIRMAN. At the time the contract was made, was it not desirable to have some competitor in the making of armor plate? There was but one establishment, the Bethlehem Company, making armor plate. The Navy Department naturally desires competitors. The supposition to my mind is that they had to hold forth an inducement to any other corporation or any other individuals to enter into the business of making armor plate, so that they would do it. Is not that true?

Secretary HERBERT. I should say it was very desirable to have another company.

The CHAIRMAN. To have two companies instead of one?

Secretary HERBERT. A company that might compete with the Bethlehem Company and to have two sources of armor supply.

Senator CHANDLER. Was that sufficiently desirable to lead Secretary Tracy to pay 2 cents a pound more for armor if the royalties had to be paid on the patents?

Secretary HERBERT. If it could not be done in any other way, I should say so.

Senator HALE. So I fancy that as the importance of this subject increase, and it was seen that we were to need large quantities of armor, the Navy Department was practically in the hands of the Bethlehem Company as to future contracts unless there was a competitor. Was not that the fact?

Secretary HERBERT. Yes.

Senator HALE. And that is what leads you to say it was very desirable that a competitor should be created?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. Therefore it was wise to make the Bethlehem Company pay 2 cents a pound, and to have the Government pay it in the case of the Carnegie Company?

Secretary HERBERT. I do not like to speak about things of that kind, but if it could be done in no other way, and the Department could not get the contract made without an indemnity of that kind, I should say that in order to have two companies competing with each other, or to have two sources of armor supply, it was necessary.

The CHAIRMAN. Two companies equally responsible?

Senator SMITH. But as I understand it, you do not know that the Carnegie Company would have made a contract if such a provision had not been embodied in it?

Secretary HERBERT. I do not know. As I have stated, there is nothing on record to show. Hypothetical questions are put to me that ex-Secretary Tracy could better answer.

Senator PERKINS. But there is nothing in the contract to prevent the two companies from pooling issues. Therefore to have a competitor, if they agreed to pool issues, would not have availed very much?

Senator TILLMAN. What guaranty have we that they have not both formed a trust, and that they are both in collusion now against the Government?

Senator BACON. Is there anything in the records to show whether the contract given to the Carnegie Company was ever offered to the Bethlehem Company, or whether there was an opportunity given for any other company to compete?

Senator CHANDLER. I will state to the Senator from Georgia that it was a part of the Bethlehem contract. Secretary Whitney acted by the authority of the Government to get armor and made a contract with the Bethlehem Company. The Bethlehem Company were under no penalties about armor. They went on to furnish gun metal very rapidly, but the production of armor dragged and, therefore, Secretary Tracy deemed it expedient to make a contract with the Carnegies, transferring a large portion of the Bethlehem contract to them at the same prices, but he made the Bethlehem Company guarantee against all patents, while he furnished to the Carnegie Company a fund of 2 cents a pound to protect both parties against this patent. Now, I should like to ask the Secretary a question in this connection.

The CHAIRMAN. Going further back, when the Secretary of the Navy made the contract with the Bethlehem Company for this very large amount, did he not give them extraordinary prices for the purpose of inducing them, in the first place, to engage in the manufacture of armor?

Senator CHANDLER. Yes; and he gave the same price to the Carnegie Company to secure a competitor.

Secretary HERBERT. I ought to state in this connection what has been suggested to me by what Senator Chandler said a moment since, that in the original contract with the Bethlehem Company there were no time penalties, and the manufacture did drag along very slowly for a great while.

Senator HALE. They were a great way behind?

Secretary HERBERT. They were a great way behind.

Senator HALE. That was an additional reason, I suppose, why a competitor was desirable?

Senator CHANDLER. It can not be said to be a competitor. It was another establishment. There had been no competition and was not likely to be. I should like to ask the Secretary whether the sum of 2 cents a pound on the armor already furnished by the Carnegie Company does not amount to about $300,000?

Secretary HERBERT. I have not footed it up. It amounted to a sum below that, I think.

Senator CHANDLER. Will you ascertain the exact amount that has been held up by the Comptroller?

Secretary HERBERT. Yes; I will give the amount that the 2 cents a pound would come to.

Senator CHANDLER. In this connection, I will ask you to give the quantities that are asked for, if you have them.

Secretary HERBERT. The gross amounts which have been paid by the Navy Department for armor for vessels of the Navy are, to the Bethlehem Company, $5,522,264.04, and to the Carnegie Steel Company, $4,657,331.53; aggregating, $10,179,595.57. The amount still to be paid out to fulfill existing contracts is about $800,000.

Senator CHANDLER. To each?

Secretary HERBERT. No, sir; to fulfill the two contracts.

Senator TILLMAN. That means that after the $800,000 have been paid we are at liberty to make new contracts and start anew?

Secretary HERBERT. Yes; new contracts.

The CHAIRMAN. To what amount is the Department now further authorized to make contracts for armor?

Secretary HERBERT. The Department is authorized by existing law to make further contracts for armor, the quantity of which is estimated at 5,650 tons, which would cost something like $3,100,000.

Senator CHANDLER. Have you made those latter contracts? What is the condition in regard to them?

Secretary HERBERT. I have not made those contracts—that is, for the last battle ships—but have had negotiations with these two companies and a good deal of conversation with them. They finally agreed to come down from the basis of $500 a ton to $450 a ton, and they have agreed in letters to me that their bids should not be above that sum. I refused to pay the same amount that was paid before. I think it was too much.

Senator CHANDLER. Will that be nickel steel?

Secretary HERBERT. Nickel steel.

Senator CHANDLER. Will the Harvey process be used?

Secretary HERBERT. Yes, sir; and the Harvey process is in addition to the $450, and it is in addition to the $500 a ton. That answers the other question.

Senator CHANDLER. It is in addition to the $800,000?

Secretary HERBERT. No, the $500 a ton.

Senator CHANDLER. If you have the Harvey process?

Secretary HERBERT. If we have the Harvey process. This $500 a ton does not include that.

Senator CHANDLER. There is no possibility of competition in making this $3,000,000 of contracts for about 5,000 tons except between these two companies?

Secretary HERBERT. That is all.

Senator CHANDLER. And there is not likely to be competition between them?

Secretary HERBERT. I think not.

Senator CHANDLER. So the Government is to be protected by your judgment and discretion in making the contract?

Secretary HERBERT. By what I can do. I have succeeded in bringing them down about 10 per cent.

Senator HALE. You do not discover any indication of their bidding against each other?

Secretary HERBERT. None.

Senator HALE. In the conferences which you speak of where you have got an agreement that they will not bid for over $450 a ton——

Secretary HERBERT. That they will make that the basis on condition that the tests are not more severe than heretofore prescribed.

Senator HALE. In those conferences did these companies join with you or act separately?

Secretary HERBERT. The representatives of both were present, and when I insisted that I ought not to be asked to pay, and told them I should absolutely refuse to pay the old prices, and that they must come down to a lower basis, they insisted that the armor was worth what they had been getting. They had come in together and were together in my office when I had this conference with them.

Senator HALE. Have you made any effort with the representatives of either of these companies, separately, to induce them to make bids on their own account and as against the other company?

Secretary HERBERT. Yes, sir. About eighteen months ago, when I was investigating the question of the armor frauds committed at the works of the Carnegie Company, I was for a time in some doubt as to what course to pursue. I thought it might be better to abrogate the Carnegie contract entirely if I could get the Bethlehem Company to take the contract at a lower price. So, without letting the Bethlehem Company know that there was any investigation going on (in fact, the

public did not know of it, for the investigation was carried on secretly, and I was especially anxious that the Bethlehem Company should not know it), I wrote a letter to the Bethlehem Company in which I stated that I was very anxious to get some more battle ships, and wanted to be able to state to Congress that I could make contracts for armor at lower prices than it had been furnished heretofore. Then I asked them the question broadly, whether, if I should give them a contract for more armor, they would be willing to take a less price than they were getting at that time. My purpose was to reduce the price of armor, if possible, and, secondly, to get information that would enable me to decide whether to annul the contract with the Carnegie Company. I intended, if I could, to make something by this investigation for the Government in the way of bringing down the price of armor. At least I was contemplating that. But Mr. Linderman replied that he could not make armor at any lower rates.

Senator HALE. He was the representative of the Bethlehem Company?

Secretary HERBERT. He was the president of the Bethlehem Company. He went on to say that the expenses were very great; that they had not yet paid for their plant, and that it was impossible to make the armor at a less price.

Senator HALE. So your effort to induce the Bethlehem Company to bid for itself as against the other company and furnish armor at lower prices was a failure?

Secretary HERBERT. Yes; it was a failure.

Senator MCMILLAN. Have you any idea what this armor may be bought for on the other side, say, in France?

Secretary HERBERT. I have some information which I would prefer not to give the source of, because the Department is making efforts in every direction, as it did when Secretary Chandler was there, to get information. I am told by the Carnegie Company that the last contract they made abroad was £108 per ton.

Senator CHANDLER. The Bethlehem Company?

Secretary HERBERT. No; I think that is the Carnegie Company. That includes, as I understand, the armor plate Harveyized and everything else. That would be about $535 a ton. I also understand from an outside course that the last contract made by the Bethlehem Company abroad was also for something over $500 a ton, and this that company also asserts. The other sources of my information I am inclined to credit, though I am saying that I discredit the statements made by the companies themselves on this point. But that is to be placed along by the side of the other fact that the first contract that was made by the Bethlehem Company abroad was at less than $300 a ton—a good deal less.

Senator CHANDLER. That contract in gross was about $600,000 worth of armor at less than $300 a ton?

Secretary HERBERT. Yes; I so understand.

Senator CHANDLER. Was that Harveyized?

Secretary HERBERT. I think it was.

Senator CHANDLER. And the price included the Harveyizing?

Secretary HERBERT. I think it did.

Senator CHANDLER. You spoke of this contract at $450 a ton. You said it did not include the Harvey process.

Secretary HERBERT. That is not included.

Senator CHANDLER. If you add $50, $75, or $100 a ton for Harveyizing, that would be carried up as high as the existing rates?

Secretary HERBERT. It would not add that much.

Senator CHANDLER. Those are the rates given in the existing contracts for Harveyizing plates.

Secretary HERBERT. Let me give you a statement about that, Senator. You see some of it is 4 and 4½ cents a pound.

Senator CHANDLER. [Exhibiting.] Here are the prices for Harveyizing.

Secretary HERBERT. [Examining.] These are the prices for Harveyizing; 4½ cents per pound on all plates under 5 inches in thickness; 3½ cents a pound on all plates the thickness of 5 inches and more up to and not including 8 inches; and 2¼ cents per pound for all plates of the thickness of 8 inches and more. This armor for which 4½ cents a pound is paid is under 5 inches in thickness. There is very little of that class. Most of the armor comes under the 2¼ cents a pound. The average of all of it is about 2.38 cents per pound.

Senator CHANDLER. Fifty dollars a ton?

Secretary HERBERT. You can call it $50 a ton—it would be about that.

Senator CHANDLER. That is in addition to any royalty?

Secretary HERBERT. Yes. I am going to give you the whole figures, as I understand them. About $50 a ton is to be added, taking the average for Harveyizing, and half a cent a pound for the royalty.

Senator CHANDLER. That would be $11.80?

Secretary HERBERT. Eleven dollars and eighty cents, which would make $61.80. If you add $61.80, which I believe is all the cost, it would make, at $450 a ton, $511.80, about the price or a little less than the price that is being paid by a foreign government to one of these firms and about the same price that is being paid to the other firm.

Senator CHANDLER. But will not that be nearly the price that will be paid on the last contracts?

Secretary HERBERT. No; on the last contracts $50 for Harveyizing and this royalty to the Harvey Company of $11.80 for the privilege of using the process have also been paid.

Senator CHANDLER. Making the average how much?

Secretary HERBERT. Making the basis $561.80. The average is a little over that. Those are the prices for the heavy armor.

Senator CHANDLER. Then your only expectation so far is that you can get a reduction of about $50 a ton?

Secretary HERBERT. About $50 a ton, and that will bring this armor down to the prices that I am informed they are now receiving from abroad.

Senator CHANDLER. Is that information in writing anywhere? Is it authentic?

Secretary HERBERT. Yes; I have it in writing. It does not come from the foreign Government, but I have it. I also have it from these companies.

Senator CHANDLER. Have you record knowledge or authentic evidence as to the prices at which the Carnegie Company and the Bethlehem Company have agreed to make armor for foreign Governments?

Secretary HERBERT. That is what I am telling you about. I have that information.

Senator CHANDLER. Is it in writing?

Secretary HERBERT. It is in writing. This is what I stated I did not care to give the sources of my information upon. I will say that it comes also from the Carnegie Company and the Bethlehem Company, and then I have the information outside of that.

Senator CHANDLER. I am not asking for the prices. You can state what the prices are more definitely than you have done. But I ask whether you have authentic information as to the prices agreed to be paid by any foreign Government to the Carnegie Company and the Bethlehem Company for armor?

Secretary HERBERT. Yes; I have that information. As I said, I have it from them and then I have it from outside sources.

Senator HALE. Do you doubt that the contract made abroad for the price of about $300 a ton, the first contract which they made, was largely a losing contract?

Secretary HERBERT. I have heard that it was. I have heard that the contract was made to get a foothold abroad.

Senator HALE. Have you any doubt that it was a losing contract?

Secretary HERBERT. It is a very difficult matter for me to say how much the plant cost. I wish to say that the claims of these companies are that they spent very large sums. Two or three million dollars, perhaps, the Bethlehem Company claims it spent in getting its plant ready. The Carnegie Company commenced after the Bethlehem Company and they have somewhat the same plant. I think the probabilities are that their plant is not quite so expensive and did not cost them so much. The Bethlehem Company, after getting the information from the Creusot Company, made their own hammer and their own machinery. They do not use the hammer process now, but the hydraulic process. They have that process and so has the Carnegie Company. That costs a great deal of money. I have not much means of judging as to how much the plant really did cost.

Senator HALE. That you take into account in estimating what they can do the work for.

Secretary HERBERT. Of course; that has to be taken into account. If I knew what the plant cost each of the companies, then I could form an estimate as to what the manufacture of the armor is really worth.

Senator CHANDLER. Have you any knowledge that the Bethlehem Company have so far made a profit on their contracts which has paid for their whole plant?

Secretary HERBERT. I do not know whether or not they have. It depends upon how much the plant cost. If I knew how much their plant cost I could answer the question. They claim that it cost a great deal of money.

Senator CHANDLER. Senator Hale asked you whether you have any doubt that the company lost money on their first contract abroad.

Secretary HERBERT. I said in reply that I could not answer definitely, because I do not know what their plant cost them.

The CHAIRMAN. We shall have to get that information from some other source than the Secretary of the Navy.

Senator HALE. I doubt whether the companies could tell.

Secretary HERBERT. I suppose the companies could tell to a dollar.

Senator TILLMAN. I wish to know if there are not sources of information accessible to you by which you can ascertain the cost of armor of the same character to the British Government, the French Government, the German Government, and to other nations which make ironclads.

Secretary HERBERT. I have done everything I could to find out about it. The contracts recently made were obtained, I understand, in competition with foreign armor makers.

Senator MCMILLAN. The price paid is about the same that we are paying now.

Secretary HERBERT. Yes, sir.

Senator MCMILLAN. The contract made abroad some time ago was an exceptional contract.

Senator TILLMAN. It is the only one of the kind. There seems to be a contradiction here between the claim that the prices charged now are fair and the explanation of the chairman and of some other gentlemen of the committee the other day that we paid enormous prices at the start because it was a tentative business and the men who entered upon it had to go to great expense to prepare their machinery and plant for doing the work. But are we expected now to pay the same price that we paid originally? It seems to me there ought to be a reduction somewhere, or else the Government will have paid for the construction of the works and then go on and pay the same price afterwards.

The CHAIRMAN. The Secretary says there has been a reduction.

Senator TILLMAN. A reduction of $50 a ton does not amount to anything, comparatively speaking.

Secretary HERBERT. I wish to say in response to Senator Tillman that I do not mean to be understood as saying that I know that the last contracts were let out to the lowest bidder. I do not know it. I know that the other armor makers, Armstrong & Co., the Englishmen, the French people, and probably the Germans, competed for the manufacture of the armor. The first contract which was made was given to the lowest bidder, and since that time it is said something over $500 a ton has been paid. Whether that contract was given to the lowest bidder after advertisement I do not know.

I think I can give the committee more information about the prices paid abroad. I have a general understanding that it is about the same price, but I can give you more accurate information as to what prices are paid abroad. It is not a question inquired into in the memorandum sent me, but I will furnish the committee, if it desires, with such information as I can get from the records of the Department with respect to the prices paid abroad.

Senator SMITH. You say you are informed, Mr. Secretary, that the bid of the Bethlehem Iron Company made abroad was $300 a ton?

Secretary HERBERT. It is a good deal less than that; something like $250 a ton.

Senator SMITH. The contract was awarded to them as the lowest bidders?

Secretary HERBERT. Yes, sir.

Senator SMITH. But you do not know that that was the case with the contract at $500 per ton?

Secretary HERBERT. No, sir; I do not know whether or not that contract was let out to the lowest bidder. I know that other people competed for the foreign contract.

The CHAIRMAN. I believe the law compels you to buy American-manufactured armor?

Secretary HERBERT. Yes, sir; it does.

Senator TILLMAN. We can change the law if we find that the American manufacturers are gouging the Government and stealing indirectly. I believe in having our naval ships made in America, out of American material, and by American workmen, but I want to have the Government pay an honest price for them, or the new Navy will cost us about twice as much as it ought to cost.

Senator MCMILLAN. Was this a large or small quantity of armor?

Secretary HERBERT. A small quantity.

Senator HALE. About $600,000 worth?

Secretary HERBERT. I do not remember the exact figures.

Senator BACON. Is there anything in the records to show that the transfer of a portion of the contract from the Bethlehem Company to the Carnegie Company was consented to by the Bethlehem Company?

Secretary HERBERT. There is nothing.

Senator BACON. I have not had time to examine the contract with any degree of care, but I notice that one section of it provides that in case the work shall lag unreasonably, etc., the Secretary of the Navy is authorized to declare the contract forfeited. Is there anything in the records to show that there was any declaration of a partial forfeiture?

Secretary HERBERT. No, sir.

Senator BACON. Is there anything in the records to show that the Bethlehem Company was communicated with in any way relative to the proposed transfer of the contract?

Secretary HERBERT. I know of nothing. If they were communicated with, I am sure the Bethlehem Company did not agree to it. I understood that they did not think it ought to be done.

Senator CHANDLER. Were they not themselves conscious of the fact that they were so far behind with the work that they were in no condition to resist the judgment of Secretary Tracy when another firm wanted to undertake to do a part of the work?

Secretary HERBERT. They did not make any active opposition that I know of, probably because they were fully three years behind with their contract.

Senator BACON. I merely wish to get on record facts which possibly are well understood. You say there is nothing in the records to show that the Bethlehem Company was ever communicated with and informed of the fact that the Government proposed to transfer a portion of the contract.

Secretary HERBERT. I ought not to answer the question without a little more thought. I do not know of anything. I have never examined to see whether or not there is, but it is my understanding that there is nothing. As I say, however, I have not examined to see.

Senator BACON. If upon investigation you should find that there is any communication of that kind, will you inform the committee of the fact?

Secretary HERBERT. Yes, sir.

Senator BACON. Was not the fact of the transfer of a portion of the contract to the Carnegie Company a matter of notoriety?

Secretary HERBERT. Oh, yes.

Senator BACON. The Bethlehem Company doubtless knew all about it?

Secretary HERBERT. Of course.

Senator BACON. Is there any communication at all from the Bethlehem Company to the Department on the subject, either agreeing to the transfer or objecting to it or making any protest against it?

Secretary HERBERT. I will look and see and inform the committee.

Senator BACON. You do not know?

Secretary HERBERT. No, sir.

Senator BACON. In response to a question either by Senator Chandler or Senator Hale, I have forgotten which one asked the question, or probably in response to several questions from different Senators, you said, in effect, that you thought the payment of 2 cents a pound in addition to the regular price was a proper thing to do, provided competition could not be secured in any other way, even if it amounted to between $300,000 and $400,000. I understand that to be your statement.

Secretary HERBERT. I said that if we could not get an additional plant in any other way I thought it was a good thing to do; that we ought not to rely entirely on one plant.

Senator BACON. Your idea is not that it was for the purpose of procuring competition?

Secretary HERBERT. I suppose it was to get competition.

The CHAIRMAN. Partly, and partly to get the facilities.

Secretary HERBERT. Partly to get another plant, but I would say that we did not get much competition.

Senator BACON. Then to the extent of the failure to secure competition the additional payment was unavailing?

Secretary HERBERT. This is all hypothetical. I suppose that is the view Secretary Tracy took of it. He knows more about it than I do, and I think the committee ought to ask him.

The CHAIRMAN. Do you not think it desirable that there should be several plants in this country, so that in case of war, when we could not get armor abroad, we should be able to secure a supply here?

Secretary HERBERT. I do.

Senator SMITH. I wish to ask a question, and not being a lawyer I ask it merely for general information. Under the contract and under the law in pursuance of which the contract was originally made with the Bethlehem people, by what authority did Secretary Tracy have any right to make a contract with the Carnegie people?

Secretary HERBERT. At that time there was a general authority in the Secretary of the Navy to contract for ordnance and ordnance materials, which was supposed to include armor. He made the contract under that authority, I suppose.

Since that time Congress, probably with reference to this contract, although I do not know that that is the case, has passed a law providing that such contracts shall be made with the lowest bidder. This contract was made without any advertisement.

Senator SMITH. I mean, at the time when the contract was made with the Bethlehem people, by what authority of law had Mr. Tracy the right to make a contract with the Carnegie people?

Secretary HERBERT. He did so under the law I speak of, which gave authority to purchase ordnance, and I think it was construed to cover armor.

Senator SMITH. But practically it does not do it in law.

Secretary HERBERT. I have not examined it particularly.

Senator SMITH. I should like to ask some of the lawyers on the committee to inquire into this question.

Secretary HERBERT. I have not examined it particularly, because the contract was made before I came into office, and a law has since been passed which guides me.

Senator SMITH. A law has since been passed?

Secretary HERBERT. A law which has since been passed, by which I am bound to let out such contracts after advertisement. I want to say to Senator Tillman, because he spoke about the probability that Congress might take this matter into consideration, that that was one of the grounds upon which I put my demand, that these people should come down lower in their prices. I threatened to lay the matter before Congress.

Senator TILLMAN. You are now required to advertise for bids for armor plate?

Secretary HERBERT. I am required to advertise, but I made this negotiation beforehand. These people were not competing with each other.

Senator TILLMAN. You have not yet made any contracts?

Secretary HERBERT. No, sir.

Senator TILLMAN. And you have not yet advertised?

Secretary HERBERT. I have not, but am about to do it. I wish to state that before Congress met, and before I put out any advertisement, I wanted to know whether we were to get the armor any cheaper than before, and therefore asked these people if they would not reduce their prices. We had a good deal of controversy on the subject, I insisting that they should bid lower, and that they should assure me beforehand that they would. They finally consented to a reduction of about 10 per cent in the price.

Senator CHANDLER. Is there any doubt that when Mr. Whitney made the original contract with the Bethlehem Company Congress had by law excepted contracts of that sort from the requirement that there should be competition, so that he had authority to make a private contract?

Secretary HERBERT. I think he had that power.

Senator CHANDLER. Did not that power remain when Secretary Tracy transferred a portion of the contract to the Carnegie Company?

Secretary HERBERT. It has been my understanding that Secretary Tracy had the power to make the contract as he did; but, as I said, I have not examined the matter particularly, because it is not a live question now.

Senator HALE. There is no doubt about it.

Senator CHANDLER. There is a new law now?

Secretary HERBERT. Yes, sir.

Senator TILLMAN. How many tons of armor do you propose to contract for?

Secretary HERBERT. Enough for the two battle ships which have been authorized. It will be about 5,650 tons.

Senator TILLMAN. It takes about 2,800 tons to a vessel?

Secretary HERBERT. Yes.

Senator PERKINS. At a cost of about $3,100,000.

Secretary HERBERT. Three million one hundred thousand dollars, estimated at the reduced price, for two vessels, making $1,550,000 each.

Senator CHANDLER. Have you any documents which you would like to put into the record explaining any points of the inquiry so far as it has gone?

Secretary HERBERT. Nothing except the contracts.

Senator CHANDLER. Mr. Chairman, shall I now ask the Secretary about another subject?

The CHAIRMAN. If you are through with this branch of the inquiry.

Senator CHANDLER. I will ask the Secretary to look at page 5 of our record.

Senator GIBSON. Why not follow the line which the resolution itself prescribes, rather than pursue what it strikes me is a desultory course of inquiry of the Secretary? The information which is desired under the resolution, as the resolution itself expresses it, is—

"To inquire whether the prices paid, or agreed to be paid, for armor for vessels of the Navy have been fair and reasonable."

Let the Secretary answer that question, amplifying it as he pleases, and involved in the amplification of his answer all he desires to say, and then let us proceed with the other line indicated in the resolution itself.

Mr. CHANDLER. What change would the Senator from Maryland suggest?

Senator GIBSON. I would ask the Secretary primarily, just as the resolution requires—

"Whether the prices paid or agreed to be paid for armor for vessels of the navy have been fair and reasonable?"

Let him answer that question.

Senator CHANDLER. I suggest that the Senator from Maryland ask the Secretary that question now.

Senator TILLMAN. I should think the inquiry would be whether the prices are fair and reasonable with respect to the future. The past does not concern us. They were contracts made under exceptional conditions, and they have to be carried out. The question is whether it is fair and reasonable for the Government to enter into contracts for armor on the terms which are offered, if the Senator from Maryland will accept the modification.

Senator GIBSON. The other inquiry will present just the features suggested by the Senator from South Carolina.

Senator TILLMAN. You are talking about past occasions, and we are dealing with future occasions, unless we are going to undertake to investigate alleged frauds in the contracts, which are not charged.

The CHAIRMAN. The question which Senator Gibson asks is part of the resolution.

Senator TILLMAN. I have no objection to the Secretary's answering the question as to the past, but I want to ask him with respect to the future.

Senator CHANDLER. Practically the Secretary has said that, under all the circumstances, the prices are fair and reasonable; but I think the suggestion of the Senator from Maryland is a very proper one—to ask the Secretary to state whether, in his judgment, the prices paid in the past have, under the circumstances, been fair and reasonable.

Secretary HERBERT. I have said that I have no means of knowing what the cost of the plant was in either case, and my means of judging is by the price which has been paid abroad, or what I understand has been paid abroad. I have told the committee I would send it such information as I have. But I would state that, if the information I have is correct, as I believe it to be, compared with prices that are being paid abroad, $450 a ton would be about a reasonable price.

Senator CHANDLER. For past contracts?

Secretary HERBERT. No; for future contracts.

Senator CHANDLER. But the question of the Senator from Maryland relates to past contracts.

Secretary HERBERT. I would state that the past contracts were not unreasonable.

Senator GIBSON. That is the scope of the inquiry.

Secretary HERBERT. Until I learned more about what was being paid abroad my impression was that those prices were very extravagant. I will state, however, that the reduction the two companies have promised to make is not so great as that in other contracts recently made by the Navy Department, where there was fair competition.

Senator TILLMAN. It seems to me, then, that you would hesitate to make that statement.

Secretary HERBERT. I simply desire to give you all the sources of information I have. The reduction in the price of the battle ships themselves has been about 28 or 30 per cent, the reduction in the price of gunboats has been about 26 per cent, and this reduction would be about 10 per cent. If it were not for what I understand has been paid abroad, I should say that $450 is too much. But if the prices paid abroad

amount to over $500, as they seem to—the information that comes to me convinces me of it—as compared with them, $450 would not be an unreasonable price, because it would be about the same that the foreign Governments are paying, although I can furnish the committee with more definite information.

Senator TILLMAN. I should prefer to get the figures of the British Government.

Secretary HERBERT. My information is not so definite about the British Government as the others, but I will give you such information as I have.

Senator PERKINS. I think the information which you have given us in relation to the cost of the plates here, and that which you propose to give us, answer pretty fully that question. If we want any further information, of course it can be obtained later.

I look upon questions 6, 7, and 8, on page 4, as more serious than anything else connected with this inquiry. I refer to charges there implied that officers of the Government who have been educated by the Government and placed in positions of trust, have been unfaithful to their duty. Those questions imply that at least, and I have a deeper feeling upon those three questions than I have upon anything else connected with the matter.

Senator CHANDLER. I have been anxious for ten minutes to go on with that branch of the inquiry.

Senator BACON. I want to ask one question in order to get it on the record. Mr. Secretary, I understand it to be a fact that after the making of the contract with the Carnegie Company, a portion of the contract previously made with the Bethlehem Company was proceeded with by the Bethlehem Company under that contract, so that at the same time the Government was having the same class of work done by the Bethlehem Company at 2 cents less per pound than by the Carnegie Company.

Secretary HERBERT. At 2 cents per pound less, if the suit by the patentees succeeds.

Senator BACON. There is an obligation in a certain contingency to pay 2 cents more?

Secretary HERBERT. The Government is obligated contingently to pay 2 cents more per pound.

Senator MCMILLAN. I understand from the Secretary that it was impossible to get the armor from the Bethlehem Company, and that the Department had to make a contract with the Carnegie Company.

Senator BACON. At the time when the Carnegie Company was making the armor plate, with the obligation on the part of the Government to pay 2 cents more per pound in a certain contingency, the Bethlehem Company was making the same armor plate at the same price without that additional obligation.

Senator CHANDLER. And paying the patentees their royalty?

Senator BACON. Yes. That is the fact, is it not, Mr. Secretary?

Secretary HERBERT. Yes, sir.

The CHAIRMAN. Before this branch of the subject is dismissed I should like to ask the Secretary whether the demand for armor plate by all the nations now is not so great as to occupy all the time of all the armor-plate manufacturers in the world, even should we not contract with our own people. Would they not find work outside from other nations, independent of us?

Secretary HERBERT. I should suppose not. These two companies are able to manufacture armor plate very much more rapidly than we need it.

The CHAIRMAN. That is the reason why they are taking additional contracts from abroad?

Secretary HERBERT. Yes. If a dozen battle ships were authorized, I suppose those two companies could furnish the armor plate for them within three years, or even less time.

The CHAIRMAN. Do you know anything about contracts made by manufacturers abroad, as to whether they are filled up with contracts or whether their works are idle?

Secretary HERBERT. I do not, except that they bid for these contracts and were in competition for them. I suppose from that that they would be able to manufacture the armor.

Senator CHANDLER. Will you look at page 5 of the record, wherein is embodied a memorandum about Mr. Harvey's patent, a copy of which has been furnished you, and make such statement as you are prepared to make on the subject of the third paragraph?

Secretary HERBERT. The Harvey process is for face-hardening armor. It consists of impregnating the face to be hardened with carbon made from wood charcoal, bone charcoal, and common coal. Harvey, who claims to be the inventor of the process, was in conference with Commander Folger, who was then chief of the Bureau. He was asking about its uses in the Navy, and it was suggested, possibly by Folger, that it be applied to the manufacture of armor. Commander Folger suggested that the process already invented by Mr. Harvey be applied to the manufacture of armor; and it was so applied. The Government made a contract for the application of the process to the face-hardening of armor, and it was under the direction of Folger. The first contract that was made with Harvey was at the rate of a half cent a pound for the armor for certain ships mentioned.

I have a copy of the contract, and will insert it in the record.

The contract referred to is as follows:

"Memorandum of an agreement of two parts, made and entered into this *twenty-first day of March, A. D. 1892*, by and between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey and doing business in said State, represented by the president of said corporation, of the one part (hereinafter called the party of the first part), and the United States, represented by the Secretary of the Navy, of the other part (hereinafter called the party of the second part).

"Whereas the party of the first part is the owner of all and singular the patented rights in and to a certain process, known as the 'Harvey process,' for the treatment of armor plate for use in the construction of vessels; and

"Whereas the parties have agreed and do hereby agree that, upon the terms hereinafter stated, armor plate manufactured or treated under the said 'Harvey process' shall, so far as possible, be supplied to such of the following-described naval vessels as the Department may from time to time designate, to wit:

[illegible] No. 6,	Gunboat No. 5,	Maine,
[illegible] No. 7,	Gunboat No. 6,	Monterey,
[illegible]r No. 8,	Puritan,	New York,
[illegible]iser No. 9,	Amphitrite,	Indiana,
[illegible]uiser No. 10,	Monadnock,	Massachusetts,
Cruiser No. 11,	Terror,	Oregon,
Cruiser No. 12,	Texas,	Ram.
Cruiser No. 13,		

"Whereas the said Harvey Steel Company, under date of March 3, 1891, in a communication signed by B. G. Clarke, president; H. A. Harvey, general manager, and Theo. Sturges, treasurer, agree to give the Navy Department the option of purchasing the right to use and employ the Harvey process for treating armor plates, as follows:

"'We hereby agree to give to the Naval Department an option for the purchase of the application of the Harvey process for treating armor plates which was tested at the Naval Ordnance Proving Ground, Annapolis, Md., Feb. 14, 1891, on the following terms, viz:

"'In the event of the process proving of value after further tests, and upon the demand by the Navy Department for its application to armor-plating, the sum of seventy-five thousand dollars is to be paid by the latter to the Harvey Steel Company as royalty therefor, and, as utilized, at the rate of one-half (½) of one (1) cent per pound of the weight of the finished plate. This royalty of one-half (½) of one (1) cent per pound is to cease when the said sum of $75,000 has been paid.

"'The Navy Department is to have the right to use the process, should it so desire, without further compensation upon all armor plating which is to be applied to vessels the construction of which is authorized by Congress at this date. In the event of the authorization by Congress of the construction of other vessels of war than those above mentioned, a new contract for the further application of the Harvey process of treating armor plates is to be made between the Naval Department and the latter, should the Department so desire.

"'It is understood that the Naval Department will undertake to bear all the expense of the experimental development of the process as applied to armor plates, our Mr. Harvey to furnish, in consultation with the Bureau of Ordnance, all details at present in his possession in regard to the process or which he may personally develop, in the perfection of his methods of treatment as applied to armor plating.'

"Whereas the Navy Department, under date of March 3, 1891, in a communication signed by Wm. M. Folger, Chief of the Bureau of Ordnance, accepted the terms of the offer of the Harvey Steel Company, as stated in the communication above mentioned, and by this agreement does accept the option offered by the party of the first part in the first paragraph of said communication; and

"Whereas the party of the second part has agreed and does hereby agree to also pay, as hereinafter set forth, the expense of applying said process in the manufacture or treatment of said armor plate:

"Now, therefore, it is mutually understood, covenanted, and agreed by and between the parties hereto that the party of the second part, upon the terms herein stated, may use and employ in the treatment of armor plate manufactured or to be manufactured for naval vessels, as hereinbefore stated, the hereinbefore-mentioned process known as the 'Harvey process.'

"The party of the first part, in consideration of the premises and provided the said process of treating said armor plate shall be conducted at the Bethlehem Iron Works, at South Bethlehem, Pennsylvania, or elsewhere, under the direction of the party of the first part, hereby guarantees that, in addition to the hereinbefore mentioned royalty of one half on one cent per pound, to be paid by the party of the second part to the party of the first part, upon armor, for vessels which have been authorized by Congress up to March 3, 1891, the additional cost to the party of the second part applying the Harvey process, hereinbefore referred to, to the armor plate as aforesaid, shall, during the period of [illegible] year from the date hereof, be nine-tenths of one cent ($0.009) per

pound of the finished plate, and that, after the expiration of the period of one year from the date hereof, the said additional cost to the party of the second part shall not exceed nine-tenths of one cent per pound of the finished plate, and in case it shall be found that the actual cost of the application of the said process to the armor plate shall have been diminished during one year from the date hereof, then the said additional cost to the party of the second part shall thereafter be equal to the said actual cost of the application of such treatment to the armor plate plus one-half (½) the difference between said actual cost of application and the sum of nine-tenths of one cent ($0.009) per pound of the finished plate.

"The party of the first part hereby further covenants and agrees that it will hold and save harmless, and, at its own expense, defend the United States from and against all and every demand or demands for or on account of the use and employment of the "Harvey process" above mentioned in the manufacture or treatment of armor, and from all and every demand or demands which shall hereafter be made for the payment of any sum or sums of money in excess of the aforesaid cost for royalty and treatment of armor under said process to be paid as hereinbefore specified and provided for in this contract.

"Finally, it is hereby mutually understood, covenanted, and agreed by and between the parties hereto that the party of the second part shall render to the party of the first part quarterly reports of all armor plate manufactured or treated under the said Harvey process which the party of the second part shall have received during the three months next preceding the dates of such reports, respectively, and within a period of thirty days after the rendition of each of said quarterly reports the party of the second part shall pay to the party of the first part such sums of money as may be required to cover the said royalty of one-half of one cent per pound, and also the cost of treatment by the said Harvey process of the armor plate which shall have been received by the party of the second part during the three months next preceding the commencement of said period of thirty days, it being hereby understood and agreed that the first of the said quarterly reports shall be rendered on or before the first day of May, 1892, and shall be thereafter rendered every three months until all the armor treated for vessels authorized by Congress to March 3, 1891, shall have been received by the party of the second part.

"In witness whereof the respective parties hereto have hereunto set their hands and seals the day and year first above written.

"Signed and sealed in the presence of—

{ SEAL OF THE COMPANY. }

"THE HARVEY STEEL COMPANY.
"By B. G. CLARKE, *Pres.*

"Attest:
"L. L. STURGES,
"*Sec'y pro tem.*

"THE UNITED STATES.
"By B. F. TRACY,
"*Secretary of the Navy.*

"WM. B. REMEY,
"*Judge-Advocate-General,*
"As to B. F. TRACY,
"*Secretary of the Navy.*"

{ SEAL OF NAVY DEPARTMENT. }

Memorandum for the Honorable the Secretary of the Navy of armor now under contract which may be Harveyized.

BUREAU OF ORDNANCE, NAVY DEPARTMENT,
Washington City, Feby. 8th, 1893.

UNDER CONTRACT WITH THE BETHLEHEM IRON CO.

Vessel.	Nature of work.	Tons.
Maine	Side armor	492.22
	Turrets	135.28
	Conning tower	15.71
Texas	Side armor	281.43
Amphitrite	Barbettes	148.31
	Turrets	110.76
	Conning tower	17.66
Terror	All too far advanced	.....
Puritan	Conning tower	21.00
	Turrets	162.00
Monadnock	Turrets	91.13
	Conning tower	21.68
Indiana	Side armor	613.56
	Barbette (1 heavy)	378.40
	Conning tower	55.15
Massachusetts	Conning tower	55.15
Total with Bethlehem Iron Co		2,659.46

UNDER CONTRACT WITH THE CARNEGIE STEEL CO.

		Tons.
Harbor-defense ram	Side and deck armor	708.71
	Conning tower	45.20
Amphitrite	Side armor	355.65
Puritan	Side armor	114.90
Monadnock	Side armor	342.15
	Barbettes	147.00
Oregon	Side armor	613.56
	Barbette (heavy)	774.80
	Barbette (light)	169.20
	Conning tower	52.09
Olympia	Con. tower and barbette	102.60
Total with Carnegie Steel Co		3,425.86
Total with Bethlehem Iron Co		2,659.46
Total with contractors		6,085.32

OF ARMOR UNDER NEW CONTRACT.

		Tons.
Indiana	Turret plates, 13-inch	287.36
	Sight hoods	6.25
	Turret plates, 8-inch	97.00
	Sight hoods	10.00
Massachusetts	Turret plates, 13-inch	287.36
	Sight hoods	6.25
	Turret plates, 8-inch	97.00
	Sight hoods	10.00
	Barbette plates, 13-inch	774.80

Memorandum for the Honorable the Secretary of the Navy of armor now under contract which may be Harveyized—Continued.

OF ARMOR UNDER NEW CONTRACT—Continued.

Vessel.	Nature of work.	Tons.
Massachusetts	Barbette plates, 8-inch	153.08
	Side armor	613.56
Oregon	Turret plates, 13-inch	287.36
	Sight hoods	6.25
	Turret plates, 8-inch	97.00
	Sight hoods	10.00
Olympia	Turret plates, 8-inch	28.24
	Sight hoods	4.00
Total of that now under advertisement		2,776.11
Total with Bethlehem Iron Co		2,659.46
Total with Carnegie Steel Co		3,425.86
Total of all armor that may be Harveyized on ships, contracts for which were let prior to that for cruiser No. 13.		8,861.43

OF ARMOR WHICH MAY BE HARVEYIZED ON SHIPS FOR WHICH CONTRACTS HAVE BEEN LET SINCE THAT FOR CRUISER NO. 13.

		Tons.
Iowa	Turret plates, 12-inch	490.00
	Sight hoods	9.00
	Turret plates, 8-inch	98.00
	Sight hoods	10.50
	Barbette plates, 12-inch	521.00
	Barbette plates, 8-inch	148.40
	Side armor	630.60
	Diagonal armor plates	234.70
	Casemate armor plates	203.40
	Conning tower	27.80
	Conning tower shield	9.50
	Conning tower shield hood	1.50
Brooklyn	Turret plates, 8-inch	92.00
	Sight hoods	10.00
	Barbette plates, 8-inch	145.00
	Side armor	155.00
	Conning tower	20.00
	Conning tower shield	5.00
	Conning tower shield hood	1.00
Total		2,812.40
		8,861.43
Total amount of armor which may be harveyized.		11,673.83

Very respectfully,

W. I. SAMPSON, *Chief of Bureau.*

Secretary HERBERT. There is a guarantee in the contract that the Government should not have to pay more than nine-tenths of 1 cent a pound, which would be about $21 or $22 a ton, for the application of this process, provided Harvey was allowed to superintend it at the works of the armor makers. Application was made to the Bethlehem Company to allow Harvey to superintend it, and the company refused

to grant it. They insisted that after being acquainted with the process they should apply it in their own way.

They refused to allow Harvey to have anything to do with it, and demanded for applying it a very much larger sum than nine-tenths of a cent per pound. In the opinion of the officers of the Department at that time it would cost a good deal more than nine-tenths of a cent a pound. So Mr. Tracy made a contract with the Bethlehem Company to Harveyize certain of the armor they were then making at the rates just indicated in the contract, which, on an average, amounted to about 2.38 cents per pound.

The contract with Harvey was considered as abrogated because it could not be carried out. It mentioned a half cent a pound as the price. Mr. Tracy then made another contract with the Carnegie Company for Harveyizing armor at the same price he had given the Bethlehem Company for applying the process, in which the contract with Harvey was not considered, because I suppose Mr. Tracy thought they would no more consent than the Bethlehem Company had consented to have Harvey superintend the process, and because they probably contended that they could not do it for anything like that sum. They at first asked about 5 cents a pound for applying the process. This sum was for the application of the process, you understand.

When I came into office I found that negotiations had been pending between the Department and the Harvey Company for the use of this process—the royalty. Folger came to me. He had been the former Chief of the Bureau.

Senator HALE. He was at that time Chief of the Bureau?

Secretary HERBERT. No, he was not. He had resigned as Chief of the Bureau in December, and he had already obtained leave to go abroad for two years. He came as the agent of that company, stating that since leaving the Bureau, he had been employed by the company to negotiate with the Department for a fair price for the use of the Harvey process; and he claimed a good deal more than half a cent a pound.

Senator BACON. You say "that company." You have mentioned several companies, and in order to have the record correct will you not state to which company you refer?

The CHAIRMAN. The Harvey Company.

Secretary HERBERT. I refer to the Harvey Company. Folger came as the agent of the Harvey Company. As agent of that company he had been negotiating with Secretary Tracy about the matter, I understood.

Senator TILLMAN. An officer of the Navy negotiating, as the agent of a private corporation, with the head of the Navy?

Secretary HERBERT. Yes, sir. He was not then connected with the Bureau. He had ceased his connection.

Senator TILLMAN. He had resigned from the Bureau?

Secretary HERBERT. Yes, sir.

Senator TILLMAN. Had he resigned from the Navy?

Secretary HERBERT. No, sir.

Senator TILLMAN. Is he in the Navy now?

Secretary HERBERT. Yes, sir; he is.

Senator CHANDLER. The first contract with the Harvey Steel Company was made March 21, 1892, before Commander Folger resigned as chief of the Bureau, and the second contract was made April 12, 1893, after he had ceased to be chief of the Bureau?

Secretary HERBERT. Yes, sir; after he ceased to be chief. The first

contract with the Harvey Company was made while he was chief of the Bureau.

Senator HALE. All the contracts are to be put in the record.

Secretary HERBERT. Yes, sir; I have copies of them to put in the record.

I understood at that time that Secretary Tracy had offered $120,000 for the Harveyizing of the armor for the ships that were then authorized, and Folger insisted that I should pay at least $150,000; that if I put it in a lump sum I could get the right for $150,000. I looked into the price, and said, "No, I shall not pay it; I will pay the same rate that has been paid heretofore, a half cent a pound, on condition that the Government is allowed in the future to use the process at a half cent a pound provided it wants to use it on all armor hereafter manufactured."

The statement was made to me then that the price paid abroad for the Harvey process—the patent has been recorded abroad—is 2 cents a pound. It is, I understand, $40 a ton.

Senator CHANDLER. Who made that statement to you?

Secretary HERBERT. I have understood it from the Chief of the Bureau of Ordnance; Folger stated it to me; the present Chief of the Bureau stated it to me, and I think it is a fact that $40 a ton is being paid abroad for the use of this process; possibly, however, the prices paid abroad may vary.

The amount that had been paid under the first contract was a half cent a pound, and it was stated in the contract that the company allowed the Government to use the process for half a cent a pound in consideration of the fact that it had been developed somewhat under the superintendency of the Bureau of Ordnance. I refused to pay more than a half cent a pound, and told him that I would use the process without paying anything; that I knew what it was; I could use it, anyway; and I would use it and let the company sue the Government before I would agree to more than half a cent a pound. Finally the company consented to take the price I offered.

I have here a letter from Mr. Frank Thomson, who is president of that company, which was written some time before that, from which it appears that the price that Secretary Tracy had offered at the time there referred to was not $120,000, but seems to have been $100,000. Here is a copy of the letter written by Mr. Frank Thomson, president of the Harvey Company, to Mr. Tracy, then head of the Navy Department:

"PHILADELPHIA, *March 1st, 1893.*

"Hon. B. F. TRACY,
"*Secretary of Navy, Washington.*

"MY DEAR SIR: Referring to our conversation which took place on the car en route from Jersey City to Philadelphia, Wednesday, February 22nd, I understood you to say that you would be willing to allow the Harvey Company $60,000 on the old contract and two cents per pound on the new contract, amounting to 2,700 tons, at $40 per ton, or $108,000, making in all $168,000, and I suggested that Com. Folger should negotiate with you on that basis."

That is, $168,000 for those ships.

"I have always felt that the Harvey Company should receive 5 cents, but in consideration of the services of the Government in the development of the system, I was willing to agree to 3 cents; but after various consultations and your presentation of the case, I acceded to 2 cents, and am still of that mind."

That would be $40 a ton.

"I am now informed by Commodore Folger that your last proposition to me, as a total payment does not amount to more than $100,000, and in all candor I must say that we can not accept the proposition under any circumstances.

"I regret extremely that you have not been able to see your way clear to deal more liberally with the owners of a patent which would bring such great results to the U. S. Government.

"Very truly, yours,

FRANK THOMSON."

One hundred and sixty-eight thousand dollars is the price Mr. Thomson demanded there, and he also demanded 2 cents a pound as royalty for armor for ships to be thereafter authorized. I contracted on the basis of a half cent a pound, $96,000, and the Government was also to have the right to use the process in the future at a half cent a pound. In the contract I made with the company there was a provision that if at any time the courts should decide the patent to be invalid, the Government should pay nothing therefor.

Senator CHANDLER. Do you refer to the contract of April 12, 1893?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. Made within six weeks after you went into the Department?

Secretary HERBERT. Yes, sir; it seems to have been pending beforehand, as appears from the proposition of Mr. Thomson, just read to you.

Senator CHANDLER. Based upon the data you have given?

Secretary HERBERT. Yes, sir. The Harvey Company was then asking $168,000 for that for which I paid $96,000. The contract was made on the basis of a half a cent a pound—about $11 a ton—instead of $40, which Mr. Thomson claimed. I made that contract by simply stating that I would not pay any more; that I would manufacture the armor, and the owners of the plant could bring suit for indemnity.

Commodore Folger had a two-year leave of absence to go abroad. I think it was understood that he intended to act as the agent of the Harvey Company abroad. Under the leave which he had he went abroad shortly after that. Not long after I came into office, however, I began to consider the question of leaves of absence and the practice of allowing officers of the Navy to take outside contracts in matters relating to the Navy, and I rescinded all the orders for long leaves and brought home every man who was doing business on his own account with any of the contractors for the Government, and indeed everybody else with the exception of Lieutenant Peary, who at that time was in the Arctic Ocean.

Senator SMITH. Were many officers on leave under such circumstances?

Secretary HERBERT. I suppose there were eight or ten. Among others was Professor Newcomb, who was going over to Baltimore two days out of a week to lecture at Johns Hopkins.

Senator CHANDLER. He was lecturing on astronomy?

Secretary HERBERT. Yes, sir; there was one officer at the works of the Carnegie Company, and there were others at other places and in other kinds of business, such as reducing nickel. That order included Commander Folger.

The CHAIRMAN. Was there anyone at the Bethlehem Works?

Secretary HERBERT. I am not sure whether there was or not.

Senator CHANDLER. Lieutenant Meigs, who is with the Bethlehem Company, has resigned from the Navy?

Secretary HERBERT. Yes, sir; he resigned and is out of the Navy, and the Bethlehem Company have a right to employ him. Lieutenant Stone was at the Carnegie Company's works, and after leaving there he for a while had a desk in the office of the Bureau of Ordnance, acting as the agent of the Carnegie Company after he had been retired from the Navy. I forbade that, too. I called these people home, and among others Commander Folger.

Senator HALE. When you say "called them home," you mean that you revoked their leaves of absence?

Secretary HERBERT. Yes, sir.

Senator HALE. They were not all abroad?

Secretary HERBERT. No, sir; Folger's resignation as Chief of the Bureau of Ordnance took effect January 2, 1893.

Senator CHANDLER. When was it tendered?

Secretary HERBERT. In December, and he was granted two years' leave of absence to go abroad. On the first of June, 1893, he informed the Department that his address was care of United States despatch agent at London. His leave was revoked November 1, 1893, by letter dated October 4, 1893.

Senator TILLMAN. What was the salary received by Commander Folger while on leave of absence?

Secretary HERBERT. Waiting-orders pay. It is the lowest salary we pay. I can tell by looking at the Register.

Senator HALE. He received waiting-orders pay.

Senator CHANDLER. It is two-thirds of full pay?

Secretary HERBERT. Yes, but I do not remember what full pay is. I shall have it looked up. Then Folger was ordered abroad to take command of a ship.

I find by the Register here that his pay was $2,300 while on leave. His sea pay would be $3,500, shore pay $3,000, waiting-orders pay $2,300.

Senator TILLMAN. While he was doing nothing?

Senator PERKINS. Except to work for a private company.

Senator TILLMAN. I mean for the Government. He was working for a private concern. None of those leaves are now in existence. You have discontinued the system?

Secretary HERBERT. Yes, sir. There is one man detailed under a special law of Congress as instructor in a college, but I have discontinued the system and do not allow an officer to go into business with any contractor.

Senator TILLMAN. You have discontinued all personal interest on the part of an officer in any business in which he is engaged?

Secretary HERBERT. I have not undertaken to order that officers shall have no private interests in business outside.

Senator TILLMAN. But you do not allow them to devote their time, for which the Government pays, to the furtherance of their private business. Of course, they have a right to invest their money in property anywhere they please, and to give it such attention as they can without neglecting their official work.

Secretary HERBERT. That is my position, Senator. You are right. Further than that, there comes the question of patents by officers.

Senator CHANDLER. Before you come to the question of patents issued to officers, I wish you would state to the committee when you first had knowledge, as asked on page 4, sixth item, that Commander Folger was to be employed or had been employed by the Harvey Company and was to have an interest in the company. Tell us what you know on that subject?

Secretary HERBERT. The first knowledge I had of his taking any interest in the company was when he came to me to make this negotiation with the Government.

Senator CHANDLER. Between the 4th of March, 1893, and April 12, 1893?

Secretary HERBERT. Yes, sir. He came to me and said that since he had got out of the Bureau of Ordnance he had been employed by the Harvey Company, and that he represented them to the extent of making that contract, and I did not know how much farther. That was as far as I knew about it and that was the first I knew of it. Commander Folger is here in the city and subject to the orders of the committee.

Senator CHANDLER. When did you learn what the contract made by the Harvey Company with him was?

Senator HALE. What Commander Folger's interest was?

Secretary HERBERT. I do not yet know definitely about it.

Senator CHANDLER. Do you know whether he was in negotiation to be employed by the company while he was chief of the Bureau?

Secretary HERBERT. No, sir; I do not.

Senator TILLMAN. It seems to me that that follows of itself; that it is self-evident.

Senator CHANDLER. Did you make any investigation as to whether the patent ought to have been granted to Harvey; whether it was a valid or a void patent?

Secretary HERBERT. No, sir; I did not.

Senator CHANDLER. You assumed that what your predecessor had done determined that question?

Secretary HERBERT. I assumed that he knew what he was doing and that he had concluded that the patent was a valid patent. I have some information here upon that question.

Senator CHANDLER. Is this [handing Secretary Herbert a letter] a copy of the letter of Secretary Tracy asking to have the patent expedited?

Secretary HERBERT (after examining copy of letter). He sent a letter, and I suppose this is a copy of it. He asked to have the patent expedited.

Senator CHANDLER. I will put the letter in the record. It is of date June 20, 1891.

The letter referred to is as follows:

"NAVY DEPARTMENT, *June 20, 1891.*

"SIR: Referring to Mr. H. A. Harvey's application, No. 387209, for patent for improvement in decrementally hardened plates and method of manufacturing the same, filed April 1, 1891:

"It appears from the report of the Chief of Bureau of Ordnance that the invention referred to is of sufficient importance to the naval service to warrant early action, and I have to request that, in accordance with rule 62 of the Rules of Practice of the Patent Office, the application for letters patent upon said invention be made special in that office.

"Very respectfully,

"B. F. TRACY,
"*Secretary of the Navy.*

"The Honorable THE SECRETARY OF THE INTERIOR."

The letter is indorsed on the back as follows:

"Under date of June 27, 1891, Com. C. E. Mitchell directed:

"'The examiner is directed to make the application herein special.'"

Secretary HERBERT. There is a practice which has prevailed for a long time, dating back from your administration of the Navy Department, Senator Chandler, to ask for the expediting of patents which are presumed to be valuable to the Navy. You ask in your memorandum sent me for an abstract of letters from the Navy Department to the Secretary of the Interior, requesting special action on applications for patents from March 4, 1881, to January 15, 1896. There were none made in 1881, 1882, or 1883. In 1884 there were five requests made.

Senator CHANDLER. You have in your hand a list of such requests?

Secretary HERBERT. Yes, sir. I will read some of the names of the inventors and the articles on which patents were asked. In 1884 there were 5. They were N. S. White, electric lamps; William F. Gardner, time system; Powlet Electric Company, automatic-steering apparatus and gear; J. A. Powlet, machine gun carriage; Rex disinfecting process, J. A. Howell, automatic broadside torpedo.

In 1885 there were 4; in 1886, 4; in 1887, 7; in 1888, 4; in 1889, 4; in 1890, 6; in 1891, 7; in 1892, 10; in 1893, 10; in 1894, 1; in 1895, 5.

Senator CHANDLER. Have you a table giving the details of these requests?

Secretary HERBERT. It does not give the details, but it contains a list of the requests.

Senator CHANDLER. It mentions the subject-matter?

Secretary HERBERT. Yes, sir; it mentions the subject-matter, showing what each patent was for.

The list referred to is as follows:

Abstract of letters from the Navy Department to the Secretary of the Interior requesting special action on applications for patents from March 4, 1881, to January 15, 1896.

Date of letter.	Name of inventor.	Article on which patent was asked.	Bureau (if any) recommending special action.
1884.			
May 5	N. S. White	Electric lamps	
May 8	Wm. F. Gardner	Time system	Navigation.
July 30	Powlett Electric Co	Automatic steering apparatus and gear	
July 31	J. A. Powlett	Machine gun carriage	
Aug. 12		Rex disinfectant process	
Oct. 7	J. A. Howell	Automatic broadside torpedo	
1885.			
Mar. 21	C. W. F. Simonds	Method of rolling articles of metal, and articles made by such method.	Ordnance.
May 20	Wm. F. Gardner	Time-ball system	
Oct. 27	Alex. Vogelgesang	Screw propeller	
Oct. 30	do	do	Steam engineering.
1886.			
June 4	A. C. Dunn	Steering apparatus	
Aug. 24	P. A. Engr. Tobin	Improvement in cast steel compound armor	
Sept. 27	G. M. Hathaway	Submarine boat	
Nov. 19	Robert M. Fryer	Armored vessel	Construction and repair.
1887.			
Jan. 18	J. G. Hendrickson	Process of coating metal surfaces with lead.	Steam engineering.

Abstract of letters from the Navy Department to the Secretary of the Interior requesting special action on applications for patents, etc.—Continued.

Date of letter.	Name of inventor.	Article on which patent was asked.	Bureau (if any) recommending special action.
1892.			
Feb. 11	C. DeB. Shepard	Invention connected with submarine vessel.	
Feb. 26	W. H. Driggs	Improvement in breech-loading rapid-firing cannon.	
July 6	Daniel Wilde	Mechanical movement to take the place of belts.	Ordnance.
Aug. 31	A. C. Dunn	Pneumatic steering gear	
Nov. 14	William A. Baldwin	Process of combining aluminum with other metals.	Do.
Nov. 23	George W. Gesner	Process of treating metals so as to render them noncorrodible.	Steam engineering.
1888.			
Jan. 6	W. H. Driggs and Seaton Schroeder.	Improvement in breech-loading ordnance.	
Apr. 7	E. R. Gill	Electric combination lock, self-adjusting relay, automatic switch signal controlling apparatus, and a secret and novel telephone call system.	Ordnance.
Aug. 4	Tilford & Redeman	Improvement in manufacture of steel	
Dec. 22	Bradley A. Fiske and Ivan Rapieff.	Range-finding instruments	
1889.			
Mar. 2	W. F. M. McCarty	Improved process of manufacturing steel.	Do.
May 3	Dana Dudley, and Hotchkiss Ordnance Company.	Torpedoes and launching apparatus	Do.
Sept. 27	Hotchkiss Ordnance Co.	Elwell's pneumatic launching gear	Do.
Nov. 16	W. H. Driggs	Percussion fuse for projectiles	Do.
1890.			
Jan. 7	William M. Wood	Projectiles	Do.
Mar. 13	Bradley A. Fiske	Method of range finding	Do.
Mar. 15	Ivan Rapieff	Range finder	Do.
May. 28	S. W. B. Diehl and John Gibson.	Improved ship's compensating binnacle	Equipment and recruiting.
Sept. 24	J. H. Brown	Improvement in manufacture of guns	Ordnance.
Dec. 19	Julius Leede	Process of making fuel gas	
1891.			
Jan. 16	Moses F. Walker	Dynamite shells	Do.
May 12	Ernest Huber and Fredk. J. Kneuper.	Nautical signals or sea telephones	Equipment.
June 20	H. A. Harvey	Hardened plates	Ordnance.
Aug. 24	Charles E. Munroe	Explosive powder and gun cotton	Do.
Sept. 2	George H. Gray	Process of manufacturing aluminum	Steel Inspection Board and Construction and Repair.
Nov. 7	F. K. Irving	Storage battery systems	Equipment.
Nov. 17	Wm. M. Wood	Improved projectile	Ordnance.
1892.			
Mar. 11	James McWade	Improvement in propellers	Steam Engineering.
June 9	E. T. Thomas	Electrodeposition of copper	
July 7	L. M. Closs	Improvements in dynamo, lamps, etc.	
July 15	W. B. Keep	Pennington air ship	(Ordnance recommended adversely.)
Sept. 30	W. W. Griscom and R. McA. Lloyd.	Secondary batteries	

Abstract of letters from the Navy Department to the Secretary of the Interior requesting special action on applications for patents, etc.—Continued.

Date of letter.	Name of inventor.	Article on which patent was asked.	Bureau (if any) recommending special action.
1892.			
Oct. 4	John Milton	Smoke-consuming device	Steam engineering.
Oct. 31	Izak Samuels	Secondary electric battery	
Dec. 3	F. F. Fletcher	Gun mountings	Ordnance.
Dec. 10	S. G. Brosius	Cylinders of marine and other engines	
Dec. 20	L. S. Van Duzer	Electrical steering apparatus	Construction and repair.
1893.			
Jan. 7	John Milton	Smoke-consuming device	Steam engineering.
Feb. 6	L. Paget	Pyroxyline compounds	
Feb. 6	Joseph A. Eno	Improvements in steam boilers and in marine boilers.	
Feb. 24	H. L. Howe	Improvements in air valves	
Mar. 3	L. Paget	Pyroxyline solvents	
Apr. 1	J. F. Drake	Torpedo launching apparatus	Ordnance.
Apr. 15	A. F. Kingsley	Improvements in smoke consumers	Steam engineering.
Aug. 5	J. G. McRoberts	Improvement in steel founding	
Sept. 21	Mason E. Leonard	Gunpowder	Ordnance.
Dec. 27	John Milton	Smoke-consuming device	Steam engineering.
1894.			
Aug. 8	Herman Lemp	Method of producing locally annealed Harveyized steel plates.	Ordnance.
1895.			
Mar. 14	W. E. Corey	Manufacture of carbonized steel	Do.
July 19	James P. Lee	Improvements in firearms	Do.
Oct. 5	G. A. Converse and J. B. Bernadou.	Manufacture of nitrocellulose, etc	Do.
Oct. 14	C. Y. Wheeler and F. L. Slocum.	Manufacture of steel containing chromium.	Do.
Nov. 12	G. W. Littlehales	Border-shading machine	Navigation.

There is nothing on file in this office to show the action taken by the Patent Office in these cases.

SAM. C. LEMLY,
Judge-Advocate-General.

NAVY DEPARTMENT, OFFICE OF JUDGE-ADVOCATE-GENERAL,
January 15, 1896.

Secretary HERBERT. Before making a request of the Interior Department to expedite a patent, it has been the custom generally, but not always, to refer the matter to some expert in the Navy Department, in order to ascertain whether the invention is particularly valuable to the Navy. That has not always been done. In 1885, for instance, it does not seem to have been done, but if you look at the face of the inventions you will see that they are all articles which the Navy wants, and in which it would naturally be interested. But that course has been more generally pursued since that time. In every case where I have made such a request, with one exception, the records show that in the first place the matter was referred to the proper bureau to ascertain whether the Navy Department was interested in the article.

Senator PERKINS. That practice also obtains in the other Departments of the Government. I have been so apprised.

Secretary HERBERT. It does, I believe. I should like to make a statement somewhat connectedly concerning the patents. I made about

the same number of requests that other Secretaries have made, and I referred every case to an expert in the proper bureau to know whether the Navy was especially interested in the article, except in one instance. I found out that in 1895 in some way or another I had made a request and did not have in writing any recommendation from a bureau. I must have had it orally. At any rate, I have made one request without having referred the matter to the proper bureau. But the rule has been, as I have stated it, and it is a very proper rule, and it has usually been followed.

One of the questions I am asked in the statement sent to the Department is about the Harvey process, in which it is said that Commander Folger is interested. That brings up the question of the interest of officers in patents. I have a list here of the officers to whom patents have been granted and shop licenses under patents given to the Department as far as they were known. I have had two or three controversies with naval officers about what amount ought to be paid them, or as to whether anything ought to be paid them at all for devices. The opinion of the Attorney-General, rendered a good long while ago, was that where a patent had been taken out by an officer for something invented by him while he was in the line of duty and pertaining to that line of duty, he was not entitled to any pay from the Government for its use, but that in other cases he was entitled to the same pay as other people; that although it might be something naval, and something that was suggested to him as a naval officer, still, if he was not in that particular line of duty he was entitled to pay for it.

The question was brought before me in the case of Lieutenant Dashiell, a very bright and efficient officer. He invented a method of improving the controlling valves on the turning engines of the turret of the New York, an improvement that was really of great value and by the use of which the turrets worked very smoothly. He asked for an allowance for it. I refused to give it to him. Then there was another—the case of Fletcher. I had quite a controversy with him about the use of his patent for breech mechanism for ordnance, and finally made a contract with him for a somewhat less price than he asked, about $10 less. I thought that the Government ought to have the right in that case to fix the compensation.

It was very important to have that breech mechanism, and it seemed to be better than any other. So I made the contract. But that case suggested that we ought to have a change of the law, and I desire to call the attention of the committee especially to this point. In my last annual report, on pages 48 and 49, the question is discussed at some length, and Congress is asked to pass a law giving the right to the Secretary of the Navy in such cases, as under present rulings an officer is allowed compensation, to pay a fair price and only such fair price as the head of the Department may think he ought to allow. Perhaps I had better read that part of my report. It is not very long.

"Inventions useful to the naval service are frequently patented by officers of the Navy. Officers have peculiar opportunities in the line of their duty for discovering the defects of naval appliances and devising remedies for the same. When they have been especially assigned to the duty of making experiments for the purpose of suggesting improvements in some particular direction, if the facilities for conducting the experiments have been furnished by the Department, and the expenses, including the procuring of patents, have been borne by the Department, the improvements or devices are the property of the United States.

"When, however, an officer is not acting under authority of the Department, and the invention does not concern a matter the officer was especially assigned the duty of investigating, and when the expenses of making experiments and procuring the letters patent are borne by the officer, it has been held that the patent is the property of the officer and is valid as against the Government itself. In order to use these devices the United States must obtain the consent of the patentee and pay him such price for the use of the same as he may demand, and it has frequently been found difficult to adjust the rights of officers as against the Government in these cases.

"The inventive genius of officers should not be suppressed, nor should they be unjustly deprived of the fruits of their labor, but, on the other hand, there ought to be no extraordinary pecuniary stimulus to turn to their own advantage knowledge acquired at the expense of the Government and tending to promote the interests of the service in which they are employed. Such a stimulus exists where the Government must do without improvements essential to its naval power or pay to persons whom it has educated and furnished the opportunities for developing such improvements such prices as they may insist upon for the same.

"The British Government has recently found it expedient to prescribe the terms under which its navy shall acquire the use of inventions patented by persons in its naval service, and the following provisions appear to me to be particularly equitable and just: 'The invention may be used by or for Her Majesty's service, and that the terms of payment, if any, shall be decided by the Admiralty,' and 'in settling terms, either for assignment or use, regard will be had by the Admiralty to any facilities in originating, working out, and perfecting the invention which the inventor may have enjoyed by reason of his official position.'

"As naval officers receive their education at the expense of the Government, and their opportunities to make improvements in naval appliances result largely from such education and the facilities afforded them by the duties they perform under the Government, I have the honor to recommend that Congress be asked to enact legislation providing that the United States may at any time acquire the right to use devices covered by letters patent issued to officers of the Navy, whether retained in their ownership or assigned to others, upon such terms and at such rate of compensation as may, by the Secretary of the Navy, be deemed just and equitable."

I recommend the passage of some law like that. In the first place, if you deny to naval officers entirely the benefit of their inventions the temptation would be very great to hand over an invention to some outsider and have him patent it. Even where an officer was disposed to be honest and not do that it would perhaps repress his inventive genius to deny him any compensation whatever. Taking it altogether, it has seemed to me that a law about like what the British Admiralty has passed, giving to officers the right to a patent where the patent was not invented while they were particularly concerned in or employed in that line, would be very well; but at the same time, in cases of that kind, inasmuch as we educate our officers and give them at least all the education upon which they proceed, the Government ought to have the right to fix the royalty.

Senator PERKINS. In this connection I wish to state that Professor Monroe, now connected with the chair of chemistry in Columbia College, when in the Naval Academy filling the chair of chemistry there,

discovered smokeless powder, and he felt that the invention belonged to the Government, and it was placed by him at the disposal of the Government.

Secretary HERBERT. I have a list here of nine or ten patents that have been taken out by officers of the Government. Here is the case of Lieutenant Driggs, for breech-loading ordnance; Lieutenant Dashiell, for breech mechanism; Lieutenant Dashiell again for breech mechanism for ordnance; Professor Monroe, for smokeless powder; Lieutenant Fletcher, a license granted under a patent for gun mounts.

Senator HALE. You will put that list in your statement?

Secretary HERBERT. I will insert it.

The list referred to is as follows:

Officers to whom patents have been granted and shop licenses under said patents given to the Department.

No.	Name of officer.	Article patented.
1	Lieut. W. H. Driggs, U. S. N	Breech-loading ordnance; license granted May 28, 1890, under patents No. 360798 and No. 378828.
2	Lieut. R. B. Dashiell, U. S. N	Breech mechanism for ordnance; license granted Sept. 15, 1890, for four (4) guns, under patent No. 438803.
3	Lieut. R. B. Dashiell, U. S. N	Breech mechanism for ordnance; license granted Jan. 22, 1892, under patent No. 370319.
4	Chas. E. Monroe, chemist, torpedo station.	Smokeless powder; applications for patents Nos. 402645 and 402646. Right to manufacture under these patents granted Aug. 14, 1891.
5	Lieut. F. F. Fletcher, U. S. N	Gun mounts; license granted Aug. 18, 1891, under patent No. 457641, for two mounts.
6	Lieut. F. F. Fletcher, U. S. N	License granted Jan. 26, 1893; application for patent No. 457271, improvement in gun mounts; application for patent No. 452272, breech mechanism for ordnance; application for patent No. 452273, improvements in system of sighting guns.
7	Lieut. A. A. Ackerman, U. S. N	Improvements in manufacture of hard-face armor; license granted January 29, 1895; application for patent No. 530240.
8	Ensign Jos. Strauss, U. S. N	Gun mounting; license granted August 24, 1895; application for patent No. 533830.
9	Commander G. A. Converse, U. S. N.; Lieut. J. B. Bernadou, U. S. N	Cellulose powder; license granted November 29, 1895; patent No. 550472.
10	Commander G. A. Converse, U. S. N.; Lieut. J. B. Bernadou, U. S. N	Apparatus for separating plastic powders; license granted November 29, 1895; patent No. 551306.

With the exception of cases No. 1, No. 5, and No. 3, all of the devices were designed by the officer in line of duty, and beyond the mere expense of taking out patents do not cost the Government anything.

Secretary HERBERT. In all these cases except those of Lieutenant Fletcher and Lieutenant Driggs, these officers discovered these things while they were in the line of their duty, and they had these patents taken out in their names, giving the Government the right to use them without royalty. The patents show on their face that they are in the interest of the Government in every case except one, and in that case the transfer was afterwards made in writing to the Government. They take out these patents for the purpose primarily of preventing anybody else from patenting them and demanding royalties of the Government.

Senator CHANDLER. The list which you have put in shows that it is a list of patents where license has been granted to the Department to use the patent?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. You have not a list of all patents issued to officers of the Navy Department?

Secretary HERBERT. No; I have not.

Senator CHANDLER. Who is your present Chief of the Bureau of Ordnance?

Secretary HERBERT. Commander Sampson.

Senator CHANDLER. What connection has Lieutenant Ackerman had with the Bureau?

Secretary HERBERT. He has been in the Bureau as an assistant; that is, he is an officer in the Bureau. He was not technically the assistant, but he has been there until recently. He has gone out and is now an inspector of the *Oregon* at San Francisco.

Senator CHANDLER. I will say that I had a telegram from him stating that he wished this investigation to go on. Now, I want to ask about Prof. Philip R. Alger. Is he in the Ordnance Bureau?

Secretary HERBERT. Yes, sir; he has been there for some time.

Senator CHANDLER. Is there a question pending in the Department, with reference to the rapid-fire guns, as to whether the Gatling gun or the Maxim gun is the best gun to be used?

Secretary HERBERT. Yes, sir.

Senator CHANDLER. [Exhibiting.] I wish you to look at these three patents, which are not down upon your list, and see whether this one, "Letters Patent No. 539010, dated May 7, 1895, application filed November 28, 1894, serial No. 530240 (no specimens)," is a patent issued to Capt. William T. Sampson and Lieutenant Ackerman for certain new and useful improvements in the manufacture of hard-faced armor. Is that upon your list?

Secretary HERBERT. It is.

Senator CHANDLER. Is Commander Sampson's name down against it?

Secretary HERBERT. No, sir.

Senator CHANDLER. Only Ackerman?

Secretary HERBERT. Only Ackerman; but that is one transferred to the Government and on record.

Senator CHANDLER. On the list the Bureau furnished you to bring here Sampson's name is omitted?

Secretary HERBERT. It is not there.

Senator CHANDLER. Is it on the specification of the patent granted which is before you?

Secretary HERBERT. It is.

Senator CHANDLER. Has Hiram Maxim, the inventor of the Maxim gun, a brother, Hudson Maxim?

Secretary HERBERT. I do not know, sir. I do not know Hudson Maxim.

Senator CHANDLER. I will say that he has. I have here a patent, "Specification of patent No. 549088, dated October 29, 1895, application filed April 13, 1895, serial No. 545610," a patent to Philip R. Alger, United States Navy, and Hudson Maxim, of New York, for certain new and useful improvements in detonating fuses. Look at that and see whether it is on your list?

Secretary HERBERT. [Examining.] It is not. I wish to make a statement about that.

Senator CHANDLER. Let me first give you the third. "Patent No.

549072, dated October 29, 1895, application filed May 27, 1895, serial No. 550866," is a patent to Hudson Maxim and Philip R. Alger again for certain new and useful improvements in detonating fuses. State whether that is on your list.

Secretary HERBERT. [Examining.] It is not.

Senator CHANDLER. Was that list furnished you from the Ordnance Bureau?

Secretary HERBERT. Yes. I was about to state, when you interrupted me, that I was told this list does not include everything that is shown in the Department, and Captain Sampson told me he thought his name was on the Ackerman patent. That is one of those patents that has been turned over to the Government, and it was turned over to the Government by assignment on the face of it, so I am informed.

Senator CHANDLER. For some reason Commander Sampson kept his own name off the list in furnishing it?

Secretary HERBERT. But he referred to it in conversation with me.

I wish to state that since this investigation has started I have come to the conclusion that the Navy Department ought to issue, and I believe I will issue, an order providing that every officer who has a patent, or is interested in a patent, or is interested in any business that concerns the navy ordnance or machinery, or the construction of vessels, or anything of that kind, shall record it in the Department in the proper office where such details are kept, so as to enable the Secretary to know the status of officers. It may be that a contest might be referred to an officer who was interested in a patent, and of course that ought not to be the case. There has never been any such regulation, but this investigation suggests to me the necessity of making a regulation of that kind.

Senator CHANDLER. Do you not think it would be a good idea, before you make any contracts for armor, to reorganize the Ordnance Bureau and leave out of its management any naval officer who holds patents on armor?

Secretary HERBERT. I do not think there is anybody in it who has patents on armor. If there is, I do not know it. The patent you referred to is not on armor, is it?

Senator CHANDLER. One of them is.

Secretary HERBERT. It is for detonating fuses.

Senator TILLMAN. I understand that Sampson and Ackerman have a patent on hardening armor, but they have given all their right and title to the Government to use it. Therefore there could be no collusion in that case.

Secretary HERBERT. The patent was really taken out for the benefit of the Government.

Senator PERKINS. I was about to state that any interest Captain Sampson or Lieutenant Ackerman have in the patent for hardening armor plate, whether vested rights by invention or otherwise, they have waived their right in favor of the Government without any royalty.

Secretary HERBERT. Yes, that is the case.

Senator PERKINS. And I so understood the Secretary to state.

Secretary HERBERT. Practically that amounts to taking out a patent for the benefit of the Government.

Senator PERKINS. They have no interest whatever in it, at least so far as the Government is concerned.

Senator CHANDLER. Do you know whether foreign patents have been taken out?

Secretary HERBERT. I asked the Chief of the Bureau whether anybody had taken out foreign patents. He said he thought Ackerman had

taken out patents abroad on this invention of his, but he did not know of anybody else who had done so.

Senator PERKINS. The Secretary has said, and there is no question about it, that whatever discovery has been made by Captain Sampson by reason of his connection with the Government he has given the Government the benefit of. Is not that the case, Mr. Secretary?

Secretary HERBERT. Yes, sir.

Senator HALE. During your administration have you discovered any attempt on the part of any officer in the Ordnance Bureau or any associate of his to force any invention upon the Government?

Secretary HERBERT. No, sir.

Senator HALE. Or any claim made for it?

Secretary HERBERT. No; I have not.

Senator HALE. Not in any case whatever?

Secretary HERBERT. The inventions of officers that I have passed on directly were the case of Fletcher and the case of Dashiell. Dashiell I denied entirely, because I did not think he had any right to compensation; Fletcher had a patent that apparently he had a right to control. I negotiated with him and gave him a less price than he claimed he ought to have. In addition to that, Fletcher had taken out other patents for the benefit of the Government, and he has one on mounts for which license was granted August 18, 1891. The Government is using those mounts, I understand. When negotiating for compensation for his breech mechanism he insisted the Department should take into consideration the fact that the Government was using some inventions which he had not patented, and perhaps others he had patented and turned over to the Government. That was in his favor, and it was the consideration of the questions thus brought up that suggested the recommendation in my last annual report that the Government ought to have control over such matters. It occurs to me (if I may make a suggestion that is a little outside of the line of the Department with which I am immediately concerned) that it would be a very good thing to apply such a rule to all the Departments of the Government. There may be inventions in the Army as well, and in the revenue service, and the Geological Survey, etc.

The CHAIRMAN. You would recommend a general law?

Secretary HERBERT. I would suggest that Congress enact a general law on the subject.

Senator BACON. What were the particular facts which induced you to come to the conclusion that Fletcher was entitled to compensation in that particular case? You may have stated them, but it escaped me.

Secretary HERBERT. The invention was made while he was not in the Ordnance Bureau. He had gotten a patent for it and had also gotten a patent for other things which he had allowed the Government to use. The benefits received by the Goverment from inventions for which he had never secured or asked any pay he mentioned by way of inducement to me to give him the prices he insisted on for his breech mechanism. In this case he had power to say that the Government should not have it without paying. In cases like this it occurs to me the head of a Department ought to have the power to say, "You are an officer of the Government; you are entitled to only so much."

Senator CHANDLER. Then if an officer of the Government took out foreign patents he would be entitled to anything he made out of those?

Secretary HERBERT. To anything he made out of them.

Senator HALE. There is no objection to that, is there?

Secretary HERBERT. I do not see any.

Senator CHANDLER. I think if an officer of the Government can make an invention and secure its adoption by his own Government, giving the Government the use of it, and then on the strength of its adoption by our Government get it patented abroad, he has a very manifest advantage by getting it introduced and making money out of it.

Secretary HERBERT. There is another statement that I desire to make, and I think it is something the committee ought to know about. It is in connection with Captain Sampson. Captain Sampson recommended me in writing about two months ago to disregard the Harvey process and say that in future contracts the Department would not be governed by it, giving the opinion himself that Senator Chandler has given, that the Harvey patent was invalid and would be so decided.

Senator CHANDLER. If you know, will you state who is counsel for Harvey to defend the validity of that patent? Is it ex-Secretary Tracy's firm?

Secretary HERBERT. I am inclined to think his firm is.

Senator CHANDLER. His firm is counsel to defend the Harvey patent. It is counsel to defeat the nickel Carnegie patent?

Secretary HERBERT. Will you let me complete my statement, so as to make it connectedly? Captain Sampson made that recommendation to me in writing, and it was at some length, giving the reasons why he thought that patent ought to be disregarded. He wanted to continue to use the process, but thought the patent ought to be disregarded. I am about to make a contract for the manufacture of armor for the two battle ships just laid out. The advertisements are being prepared and they are ready to be put out. In those advertisements Sampson recommended to me to entirely disregard that patent, because in his opinion the patent was not a valid one.

Senator HALE. And you could use the process without paying anything?

Secretary HERBERT. Without paying anything. I considered that matter pretty carefully. Looking at the contract again which I had made in 1893 with those people I find that the provision is very broad, that if any court whatever decides the patent invalid the Government is to pay nothing at all. So I concluded not to expressly state that I would disregard it, but to let the contract stand and not to pay any money. If in the suit between the Bethlehem Company and the Harvey Company the patent is decided to be valid, then the Department has a contract by which it can use the process for half a cent a pound and pay no more, whereas they claim 2 cents a pound, or $40 a ton, and claim that that is what is paid abroad. So I go on without openly disregarding the contract, but giving an order in the Department that not a cent is ever to be paid until that question is decided.

Senator CHANDLER. You are on perfectly safe grounds as far as the right is concerned?

Secretary HERBERT. I am on safe grounds, because if the Bethlehem Company should be defeated and the patent be sustained then the Government will have the right to use the patent for half a cent a pound.

Senator HALE. You have a good contract, then?

Secretary HERBERT. I think so, and do not wish to abrogate it now. But, on the other hand, if the Bethlehem Company wins that suit and the patent is decided to be invalid the Government will not have to pay a cent.

The CHAIRMAN. You are all right in either case?

Secretary HERBERT. That was my view of it.

Senator CHANDLER. There is one other subject. Is there any question pending whether there shall be used in making armor in the future a process of reforging the face of the armor after it is put through the Harvey process? Is there patented a process of that kind, and is the question pending whether that shall be adopted?

Secretary HERBERT. That is not pending just now. The patent of Sampson and Ackerman which has been granted by the Government is not a patent for Harveying, but is an additional process to be used. As I understand the purpose of the Harveying process, it is to impregnate the face of the steel with as much carbon as possible. In order to increase the surface of the plate to be hardened this patent proposes that it shall be corrugated-undulated. This gives an additional surface, you see, and on all that surface this composition is put; then when the plate is rolled down——

Senator HALE. Jammed together.

Secretary HERBERT. There is more carbon there, which has taken effect in the plate. That is the invention by Ackerman and Sampson, the patent they took out, and have given to the Government.

Senator CHANDLER. Is it to be in the next armor?

Secretary HERBERT. I think it will; it ought to be.

Senator CHANDLER. When one of the Bethlehem plates was used there was a slight crack developed on the face of it and there is a plan devised for preventing cracks on the face of a plate after it has been Harveyized by reforging the plates, and patents have been issued for that process. The one I call to your attention is the Corey patent, for which March 14, 1895, a letter was written by the Department asking it to be expedited—W. B. Corey's patent for carbonized steel. Is there a question pending in the Department whether that process of reforging shall be used in future contracts for armor?

Secretary HERBERT. That question has not been brought to my notice. If it is pending there, it has not come before me.

Senator CHANDLER. I call it to your attention and express my belief that the patent is invalid.

Secretary HERBERT. I will look into the matter. If it is pending in the Ordnance Bureau it has not yet reached me.

The CHAIRMAN. Is there anything further you wish to say?

Secretary HERBERT. I do not think of anything else, Mr. Chairman.

Senator TILLMAN. I should like to call the Secretary's attention to the last paragraph of question 10, on page 4. I will read it:

"The Secretary should also be requested to furnish to the committee any facts within his knowledge, or of which he has heard in any way, which may tend to throw light upon the subject of the investigation, whether specifically asked about those facts or not, and he should also be requested to make any suggestions and to express any opinions which he may think wise."

You have given us one suggestion in regard to an act relating to inventions by officers.

Secretary HERBERT. And another statement I made a moment ago was about the recommendation that had been made to me by Captain Sampson. There seemed to be running in these papers somewhere an intimation that perhaps he was improperly concerned in the Harvey process. This recommendation by him that the Harvey process should be disregarded would seem to me to rebut any presumption that he has any interest in it.

Senator TILLMAN [illegible] brought out here that would impl[illegible] it is at all out of the line

Secretary HERBERT. I do not think there is, so far as I know. I do not remember anything else, only I wish to say in addition that Mr. Ackerman wrote me a letter from San Francisco, when he saw this matter in the newspapers, asking that it be investigated, and I replied that I would lay his letter before the committee which was investigating that matter. I will leave that letter here among the papers. I have stated what I know about Ackerman's patent.

Hereto appended are copies of agreement:

First, of date March 21, 1892, the first agreement with the Harvey Company, for the payment of royalties, marked Exhibit A.

Second, of date February 28, 1893, with the Carnegie Company, for armor plates and for Harveyizing the same, marked Exhibit B.

Third, of date March 1, 1893, with the Bethlehem Company, for armor plate and for use thereon of the Harvey process, marked Exhibit C.

Fourth, of date March 2, 1893, with the Bethlehem Company, for the treatment of armor plates according to the Harvey process, marked Exhibit D.

Fifth, of date April 8, 1893, with the Carnegie Company, for the treatment of armor plates according to the Harvey process, marked Exhibit E.

Sixth, of date April 12, 1893, with the Harvey Company, for the payment of royalties on additional armor, etc., marked Exhibit F.

EXHIBIT A.

Memorandum of an agreement of two parts, made and entered into this twenty-first day of March, A. D. 1892, by and between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey, and doing business in said State, represented by the president of said corporation, of the one part (hereinafter called the party of the first part), and the United States, represented by the Secretary of the Navy, of the other part (hereinafter called the party of the second part).

Whereas the party of the first part is the owner of all and singular the patented rights in and to a certain process known as the "Harvey process," for the treatment of armor plate for use in the construction of vessels; and

Whereas the parties have agreed, and do hereby agree, that upon the terms hereinafter stated, armor plate manufactured or treated under the said "Harvey process" shall, so far as possible, be supplied to such of the following-described naval vessels as the Department may from time to time designate, to wit:

Cruiser No. 6.	Gunboat No. 5.	Monterey.
Cruiser No. 7.	Gunboat No. 6.	New York.
Cruiser No. 8.	Puritan.	Indiana.
Cruiser No. 9.	Amphitrite.	Massachusetts.
Cruiser No. 10.	Monadnock.	Oregon.
Cruiser No. 11.	Terror.	Ram.
Cruiser No. 12.	Texas.	
Cruiser No. 13.	Maine.	

Whereas the said Harvey Steel Company, under date of March 3, 1891, in a communication signed by B. G. Clark, president; H. A. Harvey, general manager, and Theodore Sturges, treasurer, agreed to

give the Navy Department the option of purchasing the right to use and employ the "Harvey process" for treating armor plates, as follows:

"We hereby agree to give to the Naval Department an option for the purchase of the application of the Harvey process for treating armor plates, which was tested at the Naval Ordnance Proving Ground, Annapolis, Md., February 14, 1891, on the following terms, viz:

"In the event of the process proving of value, after further tests, and upon the demand by the Naval Department for its application to armor-plating, the sum of $75,000 is to be paid by the latter to the Harvey Steel Company as royalty therefor, and as utilized, at the rate of one-half (½) of one (1) cent per pound of the weight of the finished plate. This royalty of one-half (½) of one (1) cent per pound is to cease when the said sum of $75,000 has been paid.

"The Navy Department is to have the right to use the process, should it so desire, without further compensation, upon all armor plating which is to be applied to vessels the construction of which is authorized by Congress at this date. In the event of the authorization by Congress of the construction of other vessels of war than those above mentioned, a new contract, for the further application of the Harvey process of treating armor plates, is to be made between the Naval Department and the latter, should the Department so desire.

"It is understood that the Naval Department will undertake to bear all the expense of the experimental development of the process as applied to armor plates, our Mr. Harvey to furnish, in consultation with the Bureau of Ordnance, all details at present in his possession in regard to the process, or which he may personally develop, in the perfection of his methods of treatment as applied to armor-plating."

Whereas the Navy Department, under date of March 3, 1891, in a communication signed by Wm. M. Folger, Chief of the Bureau of Ordnance, accepted the terms of the offer of the Harvey Steel Company, as stated in the communication above mentioned; and by this agreement does accept the option offered by the party of the first part in the first paragraph of said communication; and

Whereas the party of the second part has agreed, and does hereby agree, to also pay, as hereinafter set forth, the expense of applying said process in the manufacture of treatment of said armor plate;

Now, therefore, it is mutually understood, covenanted, and agreed by and between the parties hereto that the party of the second part, upon the terms herein stated, may use and employ in the treatment of armor plate manufactured or to be manufactured for naval vessels, as hereinbefore stated, the hereinbefore mentioned process known as the "Harvey process."

The party of the first part, in consideration of the premises, and provided the said process of treating said armor plate shall be conducted at the Bethlehem Iron Works, at South Bethlehem, Pennsylvania, or elsewhere, under the direction of the party of the first part, hereby guarantees that, in addition to the hereinbefore mentioned royalty of one-half of one cent per pound, to be paid by the party of the second part to the party of the first part, upon armor for vessels which have been authorized by Congress up to March 3, 1891, the additional cost to the party of the second part of applying the Harvey process, hereinbefore referred to, to the armor plate, as aforesaid, shall, during the period of one year from the date hereof, be nine-tenths of one cent ($0.009) per pound of the finished plate, and that, after the expiration of the period of one year from the date hereof, the said additional cost to the party of the second part shall not exceed nine-tenths of one cent

per pound of the finished plate, and in case it shall be found that the actual cost of the application of the said process to the armor plate shall have been diminished during one year from the date hereof, then the said additional cost to the party of the second part shall thereafter be equal to the said actual cost of the application of such treatment to the armor plate plus one-half ($\frac{1}{2}$) the difference between said actual cost of application and the sum of nine-tenths of one cent ($0.009) per pound of the finished plate.

The party of the first part hereby further covenants and agrees that it will hold and save harmless, and at its own expense defend the United States from and against all and every demand or demands for or on account of the use and employment of the "Harvey process" above mentioned in the manufacture or treatment of armor, and from all and every demand or demands which shall hereafter be made for the payment of any sum or sums of money in excess of the aforesaid cost for royalty and treatment of armor under said process, to be paid as hereinbefore specified and provided for in this contract.

Finally, it is hereby mutually understood, covenanted, and agreed by and between the parties hereto that the party of the second part shall render to the party of the first part quarterly reports of all armor plate manufactured or treated under the said Harvey process, which the party of the second part shall have received during the three months next preceding the dates of such reports, respectively, and within a period of thirty days after the rendition of each of said quarterly reports the party of the second part shall pay to the party of the first part such sum of money as may be required to cover the said royalty of one-half of one cent per pound, and also the cost of treatment by the said Harvey process of the armor plate which shall have been received by the party of the second part during the three months next preceding the commencement of said period of thirty days; it being hereby understood and agreed that the first of the said quarterly reports shall be rendered on or before the first day of May, 1892, and shall be thereafter rendered every three months until all the armor treated for vessels authorized by Congress to March 3, 1891, shall have been received by the party of the second part.

In witness whereof the respective parties hereto have hereunto set their hands and seals the day and year first above written.

Signed and sealed in presence of—

{ SEAL OF HARVEY STEEL COMPANY. }

THE HARVEY STEEL COMPANY.
By B. G. CLARK, *Pres.*

Attest:
L. L. STURGES,
Secretary pro tem.

THE UNITED STATES.
By B. F. TRACY,
As Secretary of the Navy.

WM. B. REMEY,
Judge-Advocate-General,
As to B. F. TRACY,
Secretary of the Navy.

{ SEAL OF NAVY DEPARTMENT. }

EXHIBIT B.

CONTRACT FOR NICKEL-STEEL ARMOR-PLATES AND APPURTENANCES, AND FOR HARVEYIZING.

This contract, of two parts, made and concluded this twenty-eighth day of February, A. D. 1893, by and between the Carnegie Steel Company, Limited, a limited partnership association organized under the laws of the State of Pennsylvania, and doing business in the county of Allegheny, in said State, represented by two members of the board of managers of said company, party of the first part, and the United States, represented by the Secretary of the Navy, party of the second part, witnesseth, that, for and in consideration of the payments hereinafter specified, the party of the first part, for itself and its successors and assigns, and its legal representatives, does hereby covenant and agree to and with the United States as follows, that is to say:

First. The party of the first part will, at its own risk and expense, manufacture and deliver to the Navy Department, in the manner and within the periods prescribed, and according to the conditions stated in the advertisement of the Secretary of the Navy, dated January 16, 1893, inviting proposals for nickel-steel armor plates, the proposal of the party of the first part under said advertisement, and the printed circular (including the drawings mentioned and described therein), approved by the Secretary of the Navy January 24, 1893, which advertisement, proposal, and circular, hereto annexed, shall be deemed and taken as forming part of this contract, with the like operation and effect as if the same were incorporated herein;—the nickel-steel armor plates and appurtenances therein described or referred to, and at the prices per ton for the different exhibits, and for the total price, as follows:

Class and exhibit.	Description.	Estimated number of tons.	Price per ton of each exhibit.	Total price for each exhibit, including appurtenances.
Class A, Exhibit 2...	8-inch B. L. R. turrets for Indiana	141.56	$575.00	$82,157.50
	Appurtenances	1.17	650.00	
Class A, Exhibit 4...	8-inch B. L. R. turrets for Massachusetts	141.56	575.00	82,157.50
	Appurtenances	1.17	650.00	
Class A, Exhibit 6...	8-inch B. L. R. turrets for Oregon	141.56	575.00	82,157.50
	Appurtenances	1.17	650.00	
Class A, Exhibit 8...	8-inch B. L. R. turrets for Iowa	135.50	575.00	78,705.50
	Appurtenances	1.22	650.00	
Class A, Exhibit 9...	8-inch B. L. R. turrets for Brooklyn	138.00	575.00	80,143.00
	Appurtenances	1.22	650.00	
Class A, Exhibit 10..	8-inch B. L. R. turrets for Olympia	42.64	575.00	24,934.00
	Appurtenances	.64	650.00	
Class B, Exhibit 2...	8-inch B. L. R. barbettes for Massachusetts	153.68	575.00	90,017.00
	Appurtenances	2.54	650.00	
Class B, Exhibit 3...	12-inch B. L. R. barbettes for Iowa	521.00	575.00	311,145.00
	Appurtenances	13.72	650.00	
	Appurtenances	8.16	325.00	
Class B, Exhibit 4..	8-inch B. L. R. barbettes for Iowa	148.40	575.00	86,864.00
	Appurtenances	2.36	650.00	
Class B, Exhibit 5...	8-inch B. L. R. barbettes for Brooklyn	145.00	575.00	84,909.00
	Appurtenances	2.36	650.00	
Class C, Exhibit 2....	Side armor for Iowa	630.60	515.00	335,724.50
	Appurtenances	14.37	650.00	
	Appurtenances	5.00	325.00	

Class and exhibit.	Description.	Estimated number of tons.	Price per ton of each exhibit.	Total price for each exhibit including appurtenances.
Class C, Exhibit 4....	Side armor for Brooklyn	155.00	515.00	$81,151.00
	Appurtenances	2.04	650.00	
Class D, Exhibit 1 ...	Sponson armor	101.50	725.00	73,587.50
Class E, Exhibit 1....	Casemate armor for Iowa	203.40	525.00	107,792.50
	Appurtenances	1.55	650.00	
Class E, Exhibit 2....	Splinter bulkheads	69.50	500.00	34,750.00
				1,636,195.50

It being understood that the prices for the articles classed as appurtenances in the foregoing table shall be as follows:

Name.	Price per ton.
Bolts	$650.00
Tap bolts for top plating	650.00
Cups	650.00
Nuts	650.00
Washers	650.00
Wrought-iron tubes, split	650.00
Wrought-iron tubes	325.00
Cast-steel sleeves	325.00

Subject, however, to such variations in said total price, and in the weights, and in the aggregate weight of said armor plates and appurtenances as may result from changes which may be made under provisions in the aforesaid circular relating to changes, or from the operation of other conditions therein contained which may affect the total price or weights or aggregate weight aforesaid: *Provided, however,* That the aggregate weight of the armor plates and appurtenances to be delivered under this contract shall be finally determined in accordance with the several conditions and provisions relating thereto contained in the aforesaid circular; such armor plates and appurtenances to be of domestic manufacture, and to conform to and with all the details, requirements, and stipulations relating to material, manufacture, tests, inspection, and delivery, and in all respects to the conditions stated in the aforesaid circular.

Second. It is mutually understood, covenanted, and agreed, by and between the respective parties hereto, that the party of the second part shall place with the party of the first part orders for the treatment according to a process of super-carbonization known as the Harvey process, as provided for in the circular annexed to this contract, of twenty-four hundred and sixty-six and thirty-two hundredths (2,466.32) tons, approximately, of armor plates of the thicknesses and of the approximate weights as follows, viz: three hundred and eighty-six and sixty-four hundredths (386.64) tons of plates under five inches in thickness; five hundred and fifty-five and fifty-two hundredths (555.52) tons of plates of the thickness of five inches or more, up to but not including eight inches, and fifteen hundred and twenty-four and sixteen hundredths (1,524.16) tons of plates of the thickness of eight inches or more, and that the party of the second part may, if it so desire, require the party of the first part to treat according to said Harvey process, as

aforesaid, any additional quantity of the plates to be manufactured under this contract, excepting appurtenances.

The price to be paid to the party of the first part for treating according to the Harvey process, as stipulated above, plates required under this contract shall be at the following rates, in addition to the prices for the plates as stated in the first clause hereof, viz, four and a half cents ($0.04½) per pound of all plates under five inches in thickness; three and a half cents ($0.03½) per pound of all plates of the thickness of five inches and more up to but not including eight inches, and two and a quarter cents ($0.02¼) per pound of all plates of the thickness of eight inches and more; the weights of the plates upon which the prices herein named are to be computed to be the weight of each plate as accepted in accordance with the provisions of this contract.

Third. It is mutually understood, covenanted, and agreed, by and between the parties to this contract, that changes in the conditions or requirements of the circular hereinbefore referred to, and which forms part of this contract, may be made by and with the mutual consent of the parties hereto; and, if changes are thus made, the actual cost thereof and the damage, if any, caused thereby, and the amount of the increased or diminished compensation, if any, which the party of the first part shall be entitled to receive, in consequence of such change or changes, shall be ascertained, estimated, and determined by a board of naval officers to be appointed by the Secretary of the Navy, and the determination of such board, or a majority thereof, shall be binding upon the party of the first part, and said party of the first part hereby expressly covenants and agrees to accept and abide by such determination.

Fourth. It is further mutually understood, covenanted, and agreed, by and between the parties to this contract, that every reasonable consideration shall be extended to the party of the first part in case of unavoidable delay in the manufacture and delivery of the armor plates and appurtenances aforesaid, provided it shall appear that the party of the first part has assumed the obligations of this contract in good faith, and is prosecuting the work under the same with due diligence, in which case reasonable extensions of the periods prescribed for deliveries of the armor plates and appurtenances required under this contract shall be granted. In case any delay shall arise in the prosecution of the work required under this contract, or in case any question shall arise under the provisions hereof concerning premiums or deductions, such questions, with all the facts relating thereto, shall be submitted to the Secretary of the Navy for consideration, and his decision thereon shall be conclusive and binding upon the parties to this contract, except as provided for in the tenth clause hereof.

Fifth. It is further mutually understood, covenanted, and agreed, that if at any stage of the work prior to the final completion of said armor plates and appurtenances the Secretary of the Navy shall find that the party of the first part is unable to proceed with, and make satisfactory progress in, the manufacture and delivery of the armor plates and appurtenances required, and within the periods prescribed, as aforesaid, including such extensions thereof, if any, as may have been granted under the fourth clause of this contract, then and in such case it shall be optional with the Secretary of the Navy to declare this contract forfeited on the part of the party of the first part, and in case the Secretary of the Navy shall, under the provisions of this clause, declare this contract forfeited, such forfeiture shall not affect the right of the United States to recover for defaults which may have occurred under

this contract, and as liquidated damages, a sum of money equal to the penalty of the bond accompanying the same.

Sixth. The party of the first part, in consideration of the premises, hereby covenants and agrees to hold and save the United States harmless from and against all and every demand or demands of any nature or kind for or on account of the adoption of any plan, model, design, or suggestion, or for or on account of the use of any patented invention, article, or appliance, excepting the use and employment of the said Harvey process, which has been or may be adopted or used in or about the manufacture or production of said armor plates and appurtenances, or any part thereof, under this contract, and to protect and discharge the Government from all liability on account thereof, or on account of the use thereof, by proper releases from patentees or otherwise, and to the satisfaction of the Secretary of the Navy, it being expressly understood and agreed that the party of the second part shall hold and save the party of the first part harmless from and against all and every demand or demands on account of infringement of patented rights in using and employing said Harvey process in the treatment of armor plates under this contract.

Seventh. It is mutually understood, covenanted, and agreed, by and between the respective parties hereto, that this contract shall not, nor shall any interest herein, be transferred by the party of the first part to any other person or persons.

Eighth. It is hereby mutually and expressly covenanted and agreed, and this contract is upon the express condition, that no member of or delegate to Congress, officer of the Navy, nor any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this contract, or to any benefit to arise therefrom.

Ninth. The United States, in consideration of the premises, do hereby contract, promise, and engage to and with the party of the first part as follows:

1. The contract price to be paid by the United States to the said party of the first part for armor plates and appurtenances manufactured and delivered under this contract shall be the price per ton for each exhibit as stated in the first clause of this contract, increased by the prices, as stipulated in the second clause hereof, for the treatment of armor plates according to the Harvey process.

2. Payments under this contract shall be regulated and made in accordance with the provisions contained in this contract, and in the circular aforesaid.

3. There shall be a reservation of ten per cent from the payment for each article delivered under this contract to be retained until the exhibit to which such article belongs shall have been completed.

4. No payment shall be made except upon bills in quadruplicate, certified by the inspectors in such manner as shall be directed by the Secretary of the Navy, whose final approval of all bills thus certified shall be necessary before payment thereof.

5. All warrants for payments under this contract shall be made payable to the party of the first part or its order.

6. When all the conditions, covenants, and provisions of this contract shall have been performed and fulfilled by and on the part of the party of the first part it shall be entitled, within ten days after the filing and acceptance of its claim, subject to the provisions of paragraph 76 of the circular hereinbefore mentioned relating to the replacing of rejected plates, to receive final payment under this contract on the execution of a final release to the United States, in such form as shall be approved

by the Secretary of the Navy, of all claims of any kind or description under or by virtue of this contract.

Tenth. If any doubts or disputes arise as to the meaning of anything in the circular aforesaid, or if any discrepancy appear between the same and this contract, the matter shall be at once referred to the Secretary of the Navy for determination, and the party of the first part hereby binds itself and its successors and assigns, and its legal representatives, to abide by his decision in the premises. If, however, the party of the first part shall feel aggrieved at any decision of the Secretary of the Navy, it shall have the right to submit the same to the President of the United States, and his decision shall control.

IN WITNESS WHEREOF the respective parties hereto have hereunto set their hands and seals the day and year first above written.

Signed and sealed in the presence of—

{ SEAL OF CARNEGIE STEEL CO., LIMITED. } THE CARNEGIE STEEL CO., LIMITED,
By GEO. LAUDER, *Manager*,
And by F. T. F. LOVEJOY, *Manager*.

Attest:
F. T. F. LOVEJOY, *Secretary*.

THE UNITED STATES.
By B. F. TRACY,
As Secretary of the Navy.

SAM C. LEMLY,
Judge-Advocate-General,
As to B. F. TRACY,
Secretary of the Navy.

{ SEAL OF NAVY DEPARTMENT. }

The words "it being understood that the delay in making final payment shall not exceed the period of six months after completion of deliveries under this contract" were added to the 6th paragraph of the ninth clause of this contract before execution.

F. T. F. L. G. L. B. F. T.

EXHIBIT C.

CONTRACT FOR NICKEL-STEEL ARMOR PLATES AND APPURTENANCES AND FOR HARVEYING.

This contract, of two parts, made and concluded this first day of March, A. D. 1893, by and between the Bethlehem Iron Company, a corporation created under the laws of the State of Pennsylvania, and doing business at South Bethlehem, in said State, represented by the president of said company, party of the first part, and the United States, represented by the Secretary of the Navy, party of the second part, witnesseth, that, for and in consideration of the payments hereinafter specified, the party of the first part, for itself and its successors and assigns and its legal representatives, does hereby covenant and agree to and with the United States as follows, that is to say:

First. The party of the first part will, at its own risk and expense, manufacture and deliver to the Navy Department, in the manner and within the periods prescribed, and according to the conditions stated

in the advertisement of the Secretary of the Navy, dated January 16 1893, inviting proposals for nickel-steel armor plates, the proposal of the party of the first part under said advertisement, and the printed circular (including the drawings mentioned and described therein), approved by the Secretary of the Navy January 24, 1893, which advertisement, proposal and circular, hereto annexed, shall be deemed and taken as forming part of this contract, with the like operation and effect as if the same were incorporated herein, the nickel-steel armor plates and appurtenances therein described or referred to, and at the prices per ton for the different exhibits, and for the total price, as follows:

Class and exhibit.	Description.	Estimated number of tons.	Price per ton of each exhibit.	Total price for each exhibit, including appurtenances.
Class A, Exhibit 1...	13-inch B. L. R. turrets for Indiana	358.21	$575.00	$212,048.25
	Appurtenances	9.35	650.00	
Class A, Exhibit 3...	13-inch B. L. R. turrets for Massachusetts	358.21	575.00	212,048.25
	Appurtenances	9.35	650.00	
Class A, Exhibit 5...	13-inch B. L. R. turrets for Oregon	358.21	575.30	212,048.25
	Appurtenances	9.35	650.00	
Class A, Exhibit 7...	12-inch B. L. R. turrets for Iowa	543.50	575.00	321,976.00
	Appurtenances	12.79	650.00	
Class B, Exhibit 1...	13-inch B. L. R. barbettes for Massachusetts	774.80	575.00	457,892.50
	Appurtenances	19.05	650.00	
Class C, Exhibit 1...	Side armor for Massachusetts	613.56	520.00	337,351.95
	Appurtenances	24.21	650.00	
	Appurtenances	7.89	325.00	
Class C, Exhibit 3...	Diagonal armor for Iowa	234.70	525.00	127,761.00
	Appurtenances	5.94	650.00	
	Appurtenances	2.10	325.00	
Class F, Exhibit 1...	Conning tower for Iowa	54.80	575.00	31,744.00
	Appurtenances	.36	650.00	
Class F, Exhibit 2...	Conning tower for Brooklyn	41.00	575.00	23,809.00
	Appurtenances	.36	650.00	
Class F, Exhibit 3...	Ammunition tubes	122.50	600.00	73,500.00
				2,010,179.20

It being understood that the prices for the articles classed as appurtenances in the foregoing table shall be as follows:

Name.	Price per ton.
Bolts	$650.00
Tap bolts for top plating	650.00
Cups	650.00
Nuts	650.00
Washers	650.00
Wrought-iron tubes, split	650.00
Wrought-iron tubes	325.00
Cast-steel sleeves	325.00

Subject, however, to such variations in said total price, and in the weights, and in the aggregate weight of said armor plates and appurtenances as may result from changes which may be made under provisions in the aforesaid circular relating to changes, or from the operation of other conditions therein contained which may affect the total price or weights or aggregate weight aforesaid: *Provided, however*, That the aggregate weight of the armor plates and appurtenances to be delivered under this contract shall be finally determined in accordance with the several conditions and provisions relating thereto contained in the aforesaid circular; such armor plates and appurtenances to be of domestic manufacture, and to conform to and with all the details, requirements, and stipulations relating to material, manufacture, tests, inspection, and delivery, and in all respects to the conditions stated in the aforesaid circular.

Second. It is mutually understood, covenanted, and agreed, by and between the respective parties hereto, that the party of the second part shall place with the party of the first part orders for the treatment according to a process of super-carbonization known as the Harvey process, as provided for in the circular annexed to this contract, of twenty-nine hundred and seventy-five and fourteen hundredths (2,975.14) tons, approximately, of armor plates of the thickness of eight inches or more, and that the party of the second part may, if it so desire, require the party of the first part to treat according to said Harvey process, as aforesaid, any additional quantity of the plates to be manufactured under this contract, except appurtenances and those plates included in Class F, Exhibits Nos. 1, 2, and 3, of the first clause of this contract.

The price to be paid to the party of the first part for treating according to the Harvey process, as stipulated above, plates required under this contract shall be at the following rates, in addition to the prices for the plates as stated in the first clause hereof, viz, four and a half cents ($0.04½) per pound of all plates under five inches in thickness; three and a half cents ($0.03½) per pound of all plates of the thickness of five inches and more up to but not including eight inches, and two and a quarter cents ($0.02¼) per pound of all plates of the thickness of eight inches and more; the weights of the plates upon which the prices herein named are to be computed to be the weight of each plate as accepted in accordance with the provisions of this contract.

Third. It is mutually understood, covenanted, and agreed, by and between the parties to this contract, that changes in the conditions or requirements of the circular hereinbefore referred to, and which forms part of this contract, may be made by and with the mutual consent of the parties hereto; and, if changes are thus made, the actual cost thereof and damage, if any, caused thereby, and the amount of the increased or diminished compensation, if any, which the party of the first part shall be entitled to receive, in consequence of such change or changes, shall be ascertained, estimated, and determined by a board of naval officers to be appointed by the Secretary of the Navy, and the determination of such board, or a majority thereof, shall be binding upon the party of the first part, and said party of the first part hereby expressly covenants and agrees to accept and abide by such determination.

Fourth. It is further mutually understood, covenanted, and agreed, by and between the parties to this contract, that every reasonable consideration shall be extended to the party of the first part in case of unavoidable delay in the manufacture and delivery of the armor plates and appurtenances aforesaid, provided it shall appear that the party of the first part has assumed the obligations of this contract in good

faith and is prosecuting the work under the same with due diligence, in which case reasonable extensions of the periods prescribed for deliveries of the armor plates and appurtenances required under this contract shall be granted. In case any delay shall arise in the prosecution of the work required under this contract, or in case any question shall arise under the provisions hereof concerning premiums or deductions, such questions, with all the facts relating thereto, shall be submitted to the Secretary of the Navy for consideration, and his decision thereon shall be conclusive and binding upon the parties to this contract, except as provided for in the tenth clause hereof.

Fifth. It is further mutually understood, covenanted, and agreed, that if, at any stage of the work prior to the final completion of said armor plates and appurtenances, the Secretary of the Navy shall find that the party of the first part is unable to proceed with and make satisfactory progress in the manufacture and delivery of the armor plates and appurtenances required, and within the periods prescribed, as aforesaid, including such extensions thereof, if any, as may have been granted under the fourth clause of this contract, then and in such case it shall be optional with the Secretary of the Navy to declare this contract forfeited on the part of the party of the first part, and in case the Secretary of the Navy shall, under the provisions of this clause, declare this contract forfeited, such forfeiture shall not affect the right of the United States to recover for defaults which may have occurred under this contract, and as liquidated damages, a sum of money equal to the penalty of the bond accompanying the same.

Sixth. The party of the first part, in consideration of the premises, hereby covenants and agrees to hold and save the United States harmless from and against all and every demand or demands of any nature or kind for or on account of the adoption of any plan, model, design, or suggestion, or for or on account of the use of any patented invention, article, or appliance, excepting the use and employment of the said Harvey process, which has been or may be adopted or used in or about the manufacture or production of said armor plates and appurtenances, or any part thereof, under this contract, and to protect and discharge the Government from all liability on account thereof, or on account of the use thereof, by proper releases from patentees or otherwise, and to the satisfaction of the Secretary of the Navy, it being expressly understood and agreed that the party of the second part shall hold and save the party of the first part harmless from and against all and every demand or demands on account of infringement of patented rights in using and employing said Harvey process in the treatment of armor plates under this contract.

Seventh. It is mutually understood, covenanted, and agreed, by and between the respective parties hereto, that this contract shall not, nor shall any interest herein, be transferred by the party of the first part to any other person or persons.

Eighth. It is hereby mutually and expressly covenanted and agreed, and this contract is upon the express condition, that no Member of or Delegate to Congress, officer of the Navy, nor any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this contract, or to any benefit to arise therefrom; but this stipulation, so far as it relates to Members of or Delegates to Congress, is not to be construed to extend to this contract, it being made with an incorporated company.

Ninth. The United States, in consideration of the premises, do hereby contract, promise, and engage to and with the party of the first part as follows:

1. The contract price to be paid by the United States to the said party of the first part for armor plates and appurtenances manufactured and delivered under this contract shall be the price per ton for each exhibit as stated in the first clause of this contract, increased by the prices, as stipulated in the second clause hereof, for the treatment of armor plates according to the Harvey process.

2. Payments under this contract shall be regulated and made in accordance with the provisions contained in this contract, and in the circular aforesaid.

3. There shall be a reservation of ten per cent from the payment for each article delivered under this contract, to be retained until the exhibit to which such article belongs shall have been completed.

4. No payment shall be made except upon bills in quadruplicate, certified by the inspectors in such manner as shall be directed by the Secretary of the Navy, whose final approval of all bills thus certified shall be necessary before payment thereof.

5. All warrants for payments under this contract shall be made payable to the party of the first part or its order.

6. When all the conditions, covenants, and provisions of this contract shall have been performed and fulfilled by and on the part of the party of the first part it shall be entitled, within ten days after the filing and acceptance of its claim, subject to the provisions of paragraph 76 of the circular hereinbefore mentioned relating to the replacing of rejected plates, to receive final payment under this contract on the execution of a final release to the United States, in such form as shall be approved by the Secretary of the Navy, of all claims of any kind or description under or by virtue of this contract.

Tenth. If any doubts or disputes arise as to the meaning of anything in the circular aforesaid, or if any discrepancy appear between the same and this contract, the matter shall be at once referred to the Secretary of the Navy for determination, and the party of the first part hereby binds itself and its successors and assigns, and its legal representatives, to abide by his decision in the premises. If, however, the party of the first part shall feel aggrieved at any decision of the Secretary of the Navy, it shall have the right to submit the same to the President of the United States, and his decision shall control.

In witness whereof the respective parties hereto have hereunto set their hands and seals the day and year first above written.

Signed and sealed in the presence of—

{ SEAL OF BETH- } THE BETHLEHEM IRON CO.,
{ LEHEM IRON CO. } By ROBT. P. LINDERMAN,
President.

Attest:
ABRAHAM S. SCHROPP, *Secretary.*

THE UNITED STATES,
By B. F. TRACY,
As Secretary of the Navy.

SAM. C. LEMLY,
Judge-Advocate-General.

{ SEAL OF NAVY }
{ DEPARTMENT. }

As to B. F. TRACY,
Secretary of the Navy.

The words, "it being understood that the delay in making final payment shall not exceed the period of six months after completion of deliveries under this contract," were added to the 6th paragraph of the ninth clause of this contract before execution.

B. F. T. ROBT. P. L.

EXHIBIT D.

Memorandum of an agreement for the treatment according to the Harvey process of armor plates to be manufactured and delivered under the contract with the Bethlehem Iron Company, dated June 1, 1887.

Whereas under date of June 1, 1887, a contract was entered into by and between the Bethlehem Iron Company, a corporation created under the laws of the State of Pennsylvania, and doing business at South Bethlehem, in said State, represented by the president of said company, as party of the first part, and the United States, represented by the Secretary of the Navy, as party of the second part, for the manufacture and delivery of steel armor plates and appurtenances; and

Whereas the party of the second part to said contract desires that certain of the armor plates to be manufactured and delivered under said contract, as aforesaid, shall be treated during their manufacture according to a certain process known as the Harvey process; and

Whereas by a contract entered into under date of March 21, 1892, by and between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey, and doing business in said State, represented by the president of said corporation, party of the first part, and the United States, represented by the Secretary of the Navy, as party of the second part, the party of the second part to said contract acquired the right to use and employ, in the treatment of armor plates for certain vessels, the process known as the Harvey process hereinbefore mentioned:

Now, therefore, this agreement witnesseth that, in consideration of the premises, and for and in consideration of the payments hereinafter specified, the said Bethlehem Iron Company, hereinafter called the party of the first part, does hereby, for itself and its successors and assigns and its legal representatives, covenant and agree to and with the United States, hereinafter called the party of the second part, as follows, that is to say:

The party of the first part will, at its own risk and expense, use and employ the aforesaid Harvey process in the treatment of such armor plates to be manufactured and delivered in accordance with the terms, conditions, and requirements of its contract aforesaid, as the party of the second part may designate from time to time, it being expressly understood and agreed that armor plates to be treated according to the Harvey process as hereinbefore provided for shall be subject to the requirements and conditions regarding manufacture, tests, inspection, acceptance, and tolerances, and ballistic tests for acceptance and for premiums for increased ballistic resistance prescribed in the circular concerning armor plates and appurtenances required under the advertisement of the Secretary of the Navy dated January 16, 1893, approved January 24, 1893, for armor plates to be treated according to the Harvey process, which circular, in so far as its provisions relate to the manufacture, tests, inspection, acceptance, and tolerances, and ballistic tests for acceptance and for premiums for increased ballistic resistance of armor plates to be treated according to the Harvey process, shall be deemed and taken as forming part of this agreement in like manner as if the same were incorporated herein, provided that no plates for which ingots are already cast at the time of the execution of this agreement, and which are to be treated according to the Harvey process, as herein provided for, shall be subject to the physical tests specified in paragraph 25 of the above-named circular for plates to be treated by the Harvey process, but such plates shall be subject to the physical tests required under the aforesaid contract of June 1, 1887.

It is hereby further mutually understood and agreed by and between

the respective parties hereto, that this agreement shall not, nor shall any interest herein, be transferred by the party of the first part to any other person or persons, and that no Member or Delegate to Congress, officer of the Navy, nor any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this agreement, or to any benefit to arise therefrom; but this stipulation, so far as it relates to Members of or Delegates to Congress, shall not be construed to extend to this agreement, it being made with an incorporated company.

The party of the second part, in consideration of the premises, does hereby promise and agree to and with the party of the first part as follows:

The price to be paid by the party of the second part to the party of the first part for treating armor plates according to the Harvey process, as hereinbefore provided for, shall be at the following rates, viz:

4½ cents per pound of all plates under five inches in thickness.

3½ cents per pound of all plates of the thickness of five inches and more, up to, but not including, eight inches, and

2¼ cents per pound of all plates of the thickness of eight inches and upward—

it being understood that the weights of the plates upon which the prices herein named are to be computed shall be the weight of each plate as accepted in accordance with the provisions of the aforesaid contract of June 1, 1887.

The party of the second part will hold and save the party of the first part harmless from and against all and every demand or demands of any nature or kind, for or on account of infringement of patented rights in using and employing the aforesaid Harvey process in the treatment of armor plates in accordance with the terms of this agreement.

It is further understood and agreed that the plates designated to be treated by the Harvey process as aforesaid by the party of the second part shall only include any or all of the following plates, viz, those of the side armor for the "Puritan," the side armor for the "Maine," the turret plates for the "Maine," the side armor for the "Texas," the turret plates for the "Puritan," the turret plates for the "Monadnock," and the side armor for the "Indiana."

This agreement is made subject to all the covenants, conditions, and provisons of the aforesaid contract of June 1, 1887, so far as not repugnant thereto, and shall be deemed and taken as forming a part of said contract, with the like operation and effect as if incorporated therein.

In witness whereof, the respective parties hereto have hereunto set their hands and seals this second day of March, A. D. 1893.

Signed and sealed in presence of—

{ SEAL OF CORPORATION. }

THE BETHLEHEM IRON CO.
By ROBT. P. LINDERMAN, *President.*

Attest:
ABRAHAM S. SCHROPP, *Secretary.*

THE UNITED STATES.
By B. F. TRACY, *As Secretary of the Navy.*

SAM. C. LEMLY,
Judge-Advocate-General.

{ SEAL OF NAVY DEPARTMENT. }

As to B. F. TRACY,
Secretary of the Navy.

The words, "at its own risk and expense," in lines 17 and 18, on page 2, were stricken out before execution.

ROBT. P. L. B. F. T.

EXHIBIT E.

Memorandum of an agreement for the treatment, according to the Harvey process, of armor plates to be manufactured and delivered under the contract with Carnegie, Phipps & Co., Limited, dated November 20, 1890.

Whereas under date of November 20, 1890, a contract was entered into by and between Carnegie, Phipps & Co., Limited, a limited partnership association organized under the laws of the State of Pennsylvania and doing business in the county of Allegheny, in said State, represented by the chairman and two of the managers of said association, as party of the first part, and the United States, represented by the Secretary of the Navy, as party of the second part, for the manufacture and delivery of steel armor plates and appurtenances; and

Whereas all the obligations of Carnegie, Phipps & Co., Limited, under the contract aforesaid, and all the rights and interests of said company thereunder, have been assumed and acquired by the Carnegie Steel Company, Limited, a limited partnership association organized under the laws of the State of Pennsylvania and doing business in the county of Alegheny, in said State; and

Whereas the party of the second part to said contract desires that certain of the armor plates to be manufactured thereunder, as aforesaid, shall be treated during their manufacture according to a certain process known as the Harvey process; and

Whereas by an agreement between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey and doing business in said State, and the United States, the United States has acquired the right to use and employ, in the treatment of armor plates for certain vessels for the Navy, the process known as the Harvey process, hereinbefore mentioned,

Now, therefore, this agreement witnesseth that, in consideration of the premises, and for and in consideration of the payments to be made as hereinafter specified, the said Carnegie Steel Company, Limited, hereinafter called the party of the first part, does hereby, for itself and its successors, heirs, and assigns, and its legal representatives, covenant and agree to and with the United States, hereinafter called the party of the second part, as follows, that is to say:

The party of the first part will use and employ the aforesaid Harvey process in the treatment of such armor plates to be manufactured and delivered in accordance with the terms, conditions, and requirements of its contract aforesaid as the party of the second part may designate from time to time of the weight of about fourteen hundred tons, which shall include the side armor and the 17-inch B. L. R. barbette armor for the "Oregon," it being expressly understood and agreed that armor plates to be treated according to the Harvey process as hereinbefore provided for shall be subject to the requirements and conditions regarding manufacture, tests, inspection, acceptance, and tolerances, and ballistic tests for acceptance, and for premiums for increased ballistic resistance prescribed in the circular concerning armor plates and appurtenances required under the advertisement of the Secretary of the Navy, dated January 16, 1893, approved January 24, 1893, for armor plates to be treated according to the Harvey process, which circular, in so far as its provisions relate to the manufacture, tests, inspection, acceptance, and tolerances, and ballistic tests for acceptance, and for premiums for increased ballistic resistance of armor plates to be treated according to

the Harvey process, shall be deemed and taken as forming a part of this agreement in like manner as if the same were incorporated herein; provided, that no plates for which ingots are already cast at the time of the execution of this agreement, and which are to be treated according to the Harvey process, as herein provided for, shall be subject to the physical tests specified in paragraph 25 of the above-named circular for plates to be treated by the Harvey process, but such plates shall be subject to the physical tests required under the aforesaid contract of November 20, 1890.

It is hereby further mutually understood and agreed by and between the respective parties hereto that this agreement shall not nor shall any interest herein be transferred by the party of the first part to any other person or persons, and that no Member of or Delegate to Congress, officer of the Navy, nor any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this agreement, or to any benefit to arise therefrom.

The party of the second part, in consideration of the premises, does hereby promise and agree to and with the party of the first part as follows:

The price to be paid by the party of the second part to the party of the first part for treating armor plates according to the Harvey process, as hereinbefore provided for, shall be at the following rates, viz:

Four and one-half cents per pound of all plates under five inches in thickness;

Three and one-half cents per pound of all plates of the thickness of five inches and more, up to, but not including, eight inches; and

2¼ cents per pound of all plates of the thickness of eight inches and upwards; it being understood that the weights of the plates upon which the prices herein named are to be computed shall be the weight of each plate as accepted in accordance with the provisions of the aforesaid contract of November 20, 1890.

The party of the second part will hold and save the party of the first part harmless from and against all and every demand or demands, of any nature or kind, for or on account of infringement of patented rights in using and employing the aforesaid Harvey process in the treatment of armor plates in accordance with the terms of this agreement.

This agreement is made subject to all the covenants, conditions, and provisions of the aforesaid contract of November 20, 1890, so far as not repugnant thereto, and shall be deemed and taken as forming a part of said contract with the like operation and effect as if incorporated therein.

In witness whereof the respective parties hereto have hereunto set their hands and seals this eighth day of April, A. D. 1893.

Signed, sealed, and delivered in the presence of—

{ SEAL OF THE CARNEGIE STEEL CO., LIMITED. }

THE CARNEGIE STEEL CO., LIMITED.
By JOHN G. A. LEISHMAN, *Vice-Chairman*,
By H. N. CURRY, *Manager*,
And by F. T. F. LOVEJOY, *Manager*.

Attest:
F. T. LOVEJOY, *Secretary*.

THE UNITED STATES.
By HILARY A. HERBERT,
As Secretary of the Navy.

SAM. C. LEMLY,
Judge-Advocate-General.
As to HILARY A. HERBERT,
Secretary of the Navy.

{ SEAL OF NAVY DEPARTMENT. }

EXHIBIT F.

Memorandum of an agreement of two parts made and entered into this twelfth day of April, A. D. 1893, by and between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey and doing business in said State, represented by the president of said corporation, of the one part (hereinafter called the party of the first part), and the United States, represented by the Secretary of the Navy, of the other part (hereinafter called the party of the second part).

Whereas the party of the first part is the owner of all and singular the patented rights in and to a certain process, known as the Harvey process, for the treatment of armor plates for use in the construction of vessels, and of the exclusive right to the use and employment of armor plates manufactured according to said process, as particularly set forth in letters patent of the United States, No. 460262, issued September 29, 1891, to Hayward A. Harvey, of Orange, New Jersey, for certain improvements in decrementally hardened armor plates and in the art of manufacturing the same; and

Whereas an agreement was made and entered into, under date of March 21, 1892, by and between the aforesaid parties hereto, whereby the party of the first part granted to the party of the second part the right to use and employ the Harvey process aforesaid in the manufacture of armor-plates for certain vessels of the Navy therein named, for the sum of $75,000, to be paid by the party of the second part to the party of the first part as royalty therefor, and as utilized, at the rate of one-half of one cent per pound of the finished plate, the party of the first part guaranteeing that the cost to the party of the second part of the application of said process to armor plates should not exceed nine-tenths of one cent per pound of the finished plate, provided the application of such process should be made under the direction of the party of the first part; and

Whereas the party of the second part has entered into an agreement with the Bethlehem Iron Company, of South Bethlehem, Pennsylvania, for the treatment, according to said Harvey process, of armor plates for certain of the vessels mentioned in the aforesaid agreement at a price in excess of the limit guaranteed by the party of the first part hereto, as aforesaid, the application of such process not to be made under the direction of said party of the first part:

Now, therefore, the aforesaid agreement of March 21, 1892, is hereby cancelled and annulled, and it is hereby mutually understood, covenanted, and agreed by and between the parties hereto, that for and in consideration of the premises, and in consideration of the sum of ninety-six thousand and fifty-six dollars and forty-six cents ($96,056.46), to be paid by the party of the second part to the party of the first part as royalty, the party of the second part may, upon the terms hereinafter stated, use and employ, in the treatment of armor-plates manufactured or to be manufactured for all naval vessels the construction of which was authorized by Congress up to and including July 19, 1892, the aforesaid Harvey process, and may use and employ the armor-plates for said vessels manufactured according to said process, it being understood, however, that ten per cent of said sum shall be withheld by the party of the second part until, upon the receipt of the formulæ for the compounds used and employed in the application of the Harvey process, said process shall have been tried and found to be efficient and, in the judgment of the Secretary of the Navy, of satisfactory value.

The party of the first part hereby further covenants and agrees that it will hold and save harmless, and at its own risk and expense, defend, the United States from and against all and every demand or demands for the payment of any sum or sums of money in excess of the aforesaid sum of $96,056.46 as royalty for or on account of the use and employment of said process in the treatment of armor plates under this agreement, or of the armor plates manufactured in accordance therewith, and from and against all and every demand or demands for or on account of any infringement or alleged infringement of patented rights appertaining to said process or plates.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that the party of the second part shall have the right to use and employ the aforesaid Harvey process in the treatment of armor plates for vessels which have been since July 19, 1892, or which may hereafter be, authorized by Congress, and to use and employ armor plates for such vessels manufactured according to said process, paying therefor to the party of the first part a royalty of one-half of one cent per pound of the finished plate.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that the party of the first part shall furnish full and complete information regarding the composition of the compounds employed in the Harvey process, and the application of the same, and shall impart to the party of the second part all information concerning any and all improvements which said party of the first part may, at any time in the future, make in or upon said process as covered by the aforesaid letters patent, and that the party of the second part shall have the right to adopt and use and employ any or all of such improvements in said process, and to use the armor plates manufactured in accordance therewith under the terms of this agreement, without the payment of any compensation or royalty therefor to the party of the first part, in addition to that to be paid as hereinbefore stipulated.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that this agreement shall not, nor shall any interest herein, be transferred by the party of the first part to any other person or persons, and that no Member of or Delegate to Congress, officer of the Navy, or any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this agreement or to any benefit to arise therefrom; but this stipulation, so far as it relates to Members of or Delegates to Congress, shall not be considered to extend to this agreement, it being made with an incorporated company.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that if, at any time, the party of the first part shall fail to comply with and fulfill the terms, conditions, and requirements of this agreement on its part, the party of the second part may demand and recover from the party of the first part, on account of such failure, and as liquidated damages, a sum of money equal to the penalty of the bond accompanying this agreement; and that in case it should at any time be judicially decided that the party of the first part is not legally entitled, under the letters patent aforesaid, to own and control the exclusive right to the use and employment of said process and the decrementally hardened armor plates produced thereunder, as set forth in the letters patent aforesaid, then the payment of royalty under the terms of this agreement shall cease, and all sums of money due the party of the first part from the party of the second part, as royalty for the use and employment of said process, and armor plates, as aforesaid, shall become the property of the party of the second part.

The party of the second part, in consideration of the premises, hereby covenants and agrees that all warrants for payments to be made in accordance with the terms of this agreement shall be made payable to the party of the first part or its order.

In witness whereof the respective parties hereto have hereunto set their hands and seals the day and year first above written.

Signed, sealed, and delivered in the presence of—

{ SEAL OF HARVEY STEEL CO. } HARVEY STEEL COMPANY.
By H. A. HARVEY,
President.
GEORGE P. KINGSLEY.

Attest:
WM. ALLEN SMITH,
Secretary.

{ SEAL OF NAVY DEPARTMENT. } THE UNITED STATES.
By HILARY A. HERBERT,
As Secretary of the Navy.

SAM. C. LEMLY,
Judge-Advocate-General,
As to HILARY A. HERBERT,
Secretary of the Navy.

LIEUT. A. A. ACKERMAN.

Secretary Herbert having placed in the hands of the committee the following letter, it was ordered to be printed, with the telegrams given below:

[Telegram.]

[The Western Union Telegraph Company—Received at Corcoran Bldg., SE. cor. 15th and F sts., *Washington, D. C., Dec. 31, '95.*]

Dated SAN FRANCISCO, CALIF., 31.

To Senator W. E. CHANDLER,
Washn., D. C.:

Earnestly request you to press armor inquiry.

A. A. ACKERMAN.

[Telegram,]

Dated SAN FRANCISCO, CALIFORNIA, *Dec. 31, 1895.*

BUREAU OF NAVIGATION,
Navy Department, Washington, D. C.:

Press reports to-day from East state I have used my position to profit from armor contracts; also that I am interested in patent affecting ordnance stores, material, and armor plates selected at increased prices. Urgently request immediate and complete inquiry.

A. A. ACKERMAN, *Ordnance.*

ORDNANCE OFFICE, UNION IRON WORKS,
San Francisco, Cal., January 2, 1896.

SIR: 1. Confirming the telegram addressed by me to the Bureau of Navigation on the 31st ultimo, relating to certain charges against me which have appeared in a San Francisco paper, I enclose herewith a statement which appeared in the "Examiner" of December the 31st.

2. This article has undoubtedly been inspired by some malevolently inclined person who is fully aware of all the facts of the case, with the

deliberate intention of injuring as much as possible the reputations of the officers named. It would be impossible for an innocent correspondent to so add to, suppress, and tincture the facts; that could only have been done by one acquainted fully with the details and operations of the Navy Department in the premises.

3. It is a fact that I have taken out armor patents. This is made the structure upon which a tissue of falsehood, distortion, and innuendo is hung. To dignify the whole malicious statement and give it an air of sincerity, it is stated that "Secretary Herbert is greatly exercised over the allegations made regarding his conduct of the Bureau of Ordnance while Folger was its chief."

4. I applied for a patent on an improved and cheaper method of manufacturing face-hardened armor in 1893. This is not a secret, as the article in the "Examiner" intimates. The process was fully described in the U. S. Naval Institute nearly a year ago, and has been commented upon by scientific journals both in this country and abroad.

This patent has never been offered by me to the Government, and has never to my knowledge been employed in the manufacture of armor paid for by this Government.

5. About one year ago it was found that an engineer in the employ of an English firm of armor makers had patented, both abroad and in this country, certain inventions necessary to the application of the Harvey process. These inventions had been developed by our armor makers at the suggestion and with the advice of the Bureau of Ordnance; by their aid the manufacture of face-hardened armor had been made a practical success. The Bureau of Ordnance had not patented them, however, and now found itself, in consequence, subject to a demand for royalties from foreign patentees.

6. It was therefore deemed necessary to protect the Government, and American armor makers as well, by patenting in the Government's interest certain other improvements then in use which had been suggested by Commodore Sampson and myself. These patents were obtained by the authority of the Secretary of the Navy, full right to use them being given to the Department, which paid the actual cost of procuring the patents.

7. The charges in the press can easily be proven baseless, and perhaps but few people would give them any consideration; they are wicked, however, and the person or persons who instigated them would evidently have no compunction in asserting that I shunned investigation. On the other hand, they would perhaps be satisfied if they impressed a few morbid minds with the idea that there was something that merited investigation.

8. Feeling that it is impossible to foresee in what form or at what critical time in my career these charges may be revived, I respectfully but urgently request that the Department will investigate this matter in such a manner as to place on record all the facts relating thereto.

9. I am now, after mature consideration, in doubt as to whether the circumstances are such as, under the Navy regulations, would justify my having telegraphed to the Bureau requesting an inquiry at the time it seemed most important and necessary. If my action was not warranted in the opinion of the Bureau, I hold myself responsible for the charges of transmitting the telegram.

Very respectfully,

A. A. ACKERMAN, *Lt., U. S. N.*

The CHIEF OF THE BUREAU OF NAVIGATION,
Navy Department, Washington, D. C.

COMMITTEE ON NAVAL AFFAIRS,
UNITED STATES SENATE,
Saturday, January 25, 1896.

The committee met at 11 o'clock a. m.

Present: Senators Cameron (chairman), Hale, Perkins, Chandler, Smith, Bacon, and Tillman.

LETTER FROM EX-SECRETARY TRACY.

The chairman laid before the committee the following letter from Hon. B. F. Tracy, which was ordered to be printed in the Record:

NEW YORK, *January 18, 1896.*

Hon. J. D. CAMERON,
Chairman of the Committee on Naval Affairs,
U. S. Senate, Washington, D. C.

DEAR SIR: My attention has just been called to an article which appeared in the New York Press of yesterday, a copy of which I enclose herewith. From this it appears that Secretary Herbert is to be invited to testify to-day before your committee upon the points indicated in the article, which include the following:

"First. What reason, if any, can be discovered why Secretary Tracy provided a fund of two cents a pound for armor made under the contract of the Carnegie Steel Company in addition to the price paid for the armor, when the Bethlehem Iron Company paid the royalties out of the prices received by them for armor?

"Second. How many requests have been made by the Navy Department since March 4, 1881, for the expediting of patent cases in the Patent Office, and in what cases, and with what results?"

If the committee desire to be informed of the reasons which influenced the Department in any action taken by it during my administration it would give me great pleasure to appear before the committee for that purpose, and I trust that it will give me an opportunity to do so.

In view of my numerous and pressing engagements in court I would ask that the committee give me as long a notice as possible of the date upon which it may desire my attendance, in order that I may make the necessary arrangements here.

As it will doubtless be necessary to refer to the official documents in reference to the matters of record in the Department I would suggest that, in order to save time and facilitate the inquiry, the particular subject upon which the committee desires information may be indicated to me.

As I have seen no official copy of the resolution adopted by the Senate will you kindly forward me a copy?

Sincerely, yours, B. F. TRACY.

COMMUNICATION FROM SECRETARY HERBERT.

The CHAIRMAN. I have received a communication from the Secretary of the Navy, which I lay before the committee, to be annexed as a part of his testimony.

The communication from the Secretary of the Navy is as follows:

NAVY DEPARTMENT,
Washington, January 23, 1896.

CHAIRMAN COMMITTEE ON NAVAL AFFAIRS,
U. S. Senate, Washington, D. C.

SIR: Complying with the requests of your committee to furnish, by letter, certain information, in addition to the statements made by me when I had the honor to appear before you on Saturday, the 18th inst., I have to state:

First. It appears by reference to the records of this Department that on October 2nd, 1893, a letter was transmitted from the Navy Department to the Fourth Auditor of the Treasury, enclosing a voucher in favor of the Carnegie Steel Company for the sum of $17,424.64, and asking that in accordance with the same two cents a pound on certain nickel plates should be set aside in compliance with the provisions of the contract of November 20th, 1890.

I had forgotten, during the examination on Saturday, that this letter had been transmitted since I came into office. A recurrence to the records, and conversation with the officials concerned, refreshed my memory, and I now find that the Second Comptroller, on Sept. 15, 1894, suspended the claim for the reasons set forth in a memorandum made at the time.

Second. The amount of armor included in the Carnegie contract of 1890 was 6,000 tons. Two cents per pound on this armor would amount to $268,800.

Third. No portions of the armor contracted for by the Bethlehem Company was ever given to the Carnegie Company, except some small lots which, for the sake of convenience, were transferred from one company to the other by mutual consent after the contract of 1890 had been made with the Carnegie Company. But the armor included in the contract of 1890 with the Carnegie Company had never been legally obligated to the Bethlehem Company. The contract of June 1st, 1887, with the Bethlehem Iron Company was for armor for six vessels only, viz, the *Maine* and *Texas*, and the four monitors, *Amphitrite*, *Terror*, *Monadnock*, and *Puritan*, amounting in all to about 6,700 tons of armor. The contract of November 20th, 1890, with the Carnegie Steel Company was for an additional supply of 6,000 tons of armor for vessels whose construction had been authorized subsequent to the making of the Bethlehem contract.

It does not appear that the Bethlehem Company made any protest which is now of record against this Carnegie contract. The discontent of this company, of which I spoke on Saturday last and which was also assumed in the questions of certain members of your committee, arose doubtless from the fact that they supposed there was an implied obligation on the part of the Navy Department, arising out of the contract of 1887 with Secretary Whitney, to give to the Bethlehem Company contracts for all the armor thereafter to be manufactured, in consideration of the very heavy expense to which they claimed they had been put in creating the plant for armor manufacture. Such discontent did exist, as I personally know, and its expression, more or less public, doubtless gave rise to the impression which seems to exist in the minds of some of the members of the committee—that the contract with the Carnegie Company was for the manufacture of armor which had been previously obligated to the Bethlehem Company.

With regard to the contract of November 20th, 1890, with the Carnegie Steel Company, I have thought proper to copy certain extracts from the reports of Hon. B. F. Tracy, as Secretary of the Navy, for the years 1890–91 and '92, in which he speaks on this subject fully, and gives the reasons which prompted him to make that contract:

EXTRACT FROM THE REPORT OF THE SECRETARY OF THE NAVY FOR THE YEAR 1890.

"The Department during the past year has experienced great disappointment in reference to the armor contract of the Bethlehem Iron Company. This contract, which was justly considered the crowning triumph of my predecessor, was signed on June 1, 1887, and called for the completion of a plant for the manufacture of armor two and one-half years from the date of contract—that is, on December 1, 1890. It further provided for the delivery of 300 tons within two months from and after the expiration of the contract time for the completion of an adequate plant, delivery to be continued thereafter at the rate of 300 tons per month, and to be fully completed within two years from the date of such first delivery. On the date fixed by the contract the work of constructing the plant was far from completion.

"The Department has endeavored during the past year, by every means at its command, including remonstrance, solicitation, and urgent request, to hasten the performance of the work. Repeated assurances have been given by the company, fixing various prospective dates, only to be followed by new disappointments. When it is considered that this contract includes the side and turret armor for all the monitors and for the *Maine* and *Texas*, the serious consequences of the delay are manifest.

"In January, 1890, the company stated that they would be ready to begin manufacture within six months, and would be able to deliver from 1,500 to 2,000 tons this year; but this prospect ended like previous ones, in disappointment. In July the company said:

"'While the estimate, as stated in our letter of January 25, 1890, as to the time of beginning manufacture was at fault, we are still expecting to commence within the next two months the manufacture of certain armor, for which we have received drawings, and which we understand is now urgently needed, namely, the bulkhead plates of the *Maine*, the conning tower of the *Terror*, and the conning tower communication of the *Texas*. As to the amount of plates that we hoped to deliver at the time of your interview * * * we expected to be able to produce a considerable amount of *thick plates* with our present appliances, and added to this, if the protective deck plating covered by Exhibit U of our specifications were now needed by the Department, we could arrange to have a considerable portion of it rolled elsewhere and brought to our works for shaping, tempering, and fitting, and thus also in good part fulfill our statement as to the amount we could deliver during the present year.

"'We are fully aware, however, that the deliveries above referred to are of the nature of temporary expedients, and that the end so earnestly desired by all parties concerned, and of paramount importance, viz, the completion of our hammer plant and the regular deliveries of the hammered and tempered plates for side armor, has been and will be delayed beyond our expectations.

"'As is always the case in undertakings of such magnitude the causes of delay have been numerous, and while no "unforeseen contingencies" have arisen of such a pronounced nature as to lead us at the time to formally draw the attention of the Department thereto there have been several causes of serious delay which were beyond our control.'

"The date now fixed for the entire completion of the plant is July-September, 1891, nearly two years after the contract time.

"At the present time it seems probable that deliveries may be made for acceptance test as early as August, 1891, but under favorable circumstances the completed armor could hardly be ready before October 1, if then. This date may therefore be fixed as the earliest at which deliveries are likely to begin, and the completion of the *Maine*, the *Texas*, and the monitors is likely to be delayed accordingly. In the case of the *Maine* a slight change has already been necessary in the design to permit the work to go on notwithstanding the nondelivery of the armor.

"As early as July last it became evident that the first 300 tons of armor required by the Bethlehem contract would not be delivered prior to October 1, 1891, and that even after that date deliveries would be so slow as to postpone for many years the completion of the ships then authorized, if Bethlehem remained the sole reliance. To complete deliveries under the original contract at the prescribed rate requires two years; and though it is hoped that the company may be able to exceed this rate when fairly started, yet the fact is noted by the Department that 300 tons a month is the output of the largest manufactories of armor in England. At this rate the armor for ships now under construction, but not covered by the Bethlehem contract, amounting to about 14,000 tons, could not be fully delivered by this firm alone in less than six years from the present time, and the completion of ships would be delayed accordingly. It therefore became imperative for the Government to obtain the cooperation of another manufacturer and secure, as in the case of the gun forgings, the creation of a second plant for the manufacture of armor in the United States.

"Accordingly, negotiations were opened with Messrs. Carnegie, Phipps & Co., the largest steel manufacturers in the United States, if not in the world, with a view to the establishment of another plant; and an agreement has been concluded with this firm for the manufacture of 6,000 tons of armor, at the same price as in the contract of 1887 with Bethlehem, to be of all steel or nickel-steel, at the option of the Department. The contract binds the firm to begin delivery of armor in June next, and to deliver 500 tons per month thereafter.

"If both companies deliver at the maximum rate called for by the contracts, it will require over two years from July, 1891, to complete the manufacture of the armor required for the ships now authorized, and some of them will be ready for it in advance of the time."

REPORT FOR THE YEAR 1891.

"By far the most momentous question which the Department has had to consider in connection with the construction of the new Navy is that of armor: First, to secure a supply of American manufacture; and secondly, to determine what kind of armor should be adopted, having reference both to its composition and mode of treatment.

"The more this subject is studied, the more remarkable appears the foresight and judgment with which the first contract of 1887 was effected, and the creation assured of the unequaled plant now in the last stages of completion at South Bethlehem. That difficulties and delays should attend a work of such magnitude is unavoidable, and the establishment of armor manufacture in the United States has been no exception to the rule.

"The report of last year described the unsatisfactory condition at

EXHIBIT E.

Memorandum of an agreement for the treatment, according to the Harvey process, of armor plates to be manufactured and delivered under the contract with Carnegie, Phipps & Co., Limited, dated November 20, 1890.

Whereas under date of November 20, 1890, a contract was entered into by and between Carnegie, Phipps & Co., Limited, a limited partnership association organized under the laws of the State of Pennsylvania and doing business in the county of Allegheny, in said State, represented by the chairman and two of the managers of said association, as party of the first part, and the United States, represented by the Secretary of the Navy, as party of the second part, for the manufacture and delivery of steel armor plates and appurtenances; and

Whereas all the obligations of Carnegie, Phipps & Co., Limited, under the contract aforesaid, and all the rights and interests of said company thereunder, have been assumed and acquired by the Carnegie Steel Company, Limited, a limited partnership association organized under the laws of the State of Pennsylvania and doing business in the county of Alegheny, in said State; and

Whereas the party of the second part to said contract desires that certain of the armor plates to be manufactured thereunder, as aforesaid, shall be treated during their manufacture according to a certain process known as the Harvey process; and

Whereas by an agreement between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey and doing business in said State, and the United States, the United States has acquired the right to use and employ, in the treatment of armor plates for certain vessels for the Navy, the process known as the Harvey process, hereinbefore mentioned,

Now, therefore, this agreement witnesseth that, in consideration of the premises, and for and in consideration of the payments to be made as hereinafter specified, the said Carnegie Steel Company, Limited, hereinafter called the party of the first part, does hereby, for itself and its successors, heirs, and assigns, and its legal representatives, covenant and agree to and with the United States, hereinafter called the party of the second part, as follows, that is to say:

The party of the first part will use and employ the aforesaid Harvey process in the treatment of such armor plates to be manufactured and delivered in accordance with the terms, conditions, and requirements of its contract aforesaid as the party of the second part may designate from time to time of the weight of about fourteen hundred tons, which shall include the side armor and the 17-inch B. L. R. barbette armor for the "Oregon," it being expressly understood and agreed that armor plates to be treated according to the Harvey process as hereinbefore provided for shall be subject to the requirements and conditions regarding manufacture, tests, inspection, acceptance, and tolerances, and ballistic tests for acceptance, and for premiums for increased ballistic resistance prescribed in the circular concerning armor plates and appurtenances required under the advertisement of the Secretary of the Navy, dated January 16, 1893, approved January 24, 1893, for armor plates to be treated according to the Harvey process, which circular, in so far as its provisions relate to the manufacture, tests, inspection, acceptance, and tolerances, and ballistic tests for acceptance, and for premiums for increased ballistic resistance of armor plates to be treated according to

the Harvey process, shall be deemed and taken as forming a part of this agreement in like manner as if the same were incorporated herein; provided, that no plates for which ingots are already cast at the time of the execution of this agreement, and which are to be treated according to the Harvey process, as herein provided for, shall be subject to the physical tests specified in paragraph 25 of the above-named circular for plates to be treated by the Harvey process, but such plates shall be subject to the physical tests required under the aforesaid contract of November 20, 1890.

It is hereby further mutually understood and agreed by and between the respective parties hereto that this agreement shall not nor shall any interest herein be transferred by the party of the first part to any other person or persons, and that no Member of or Delegate to Congress, officer of the Navy, nor any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this agreement, or to any benefit to arise therefrom.

The party of the second part, in consideration of the premises, does hereby promise and agree to and with the party of the first part as follows:

The price to be paid by the party of the second part to the party of the first part for treating armor plates according to the Harvey process, as hereinbefore provided for, shall be at the following rates, viz:

Four and one-half cents per pound of all plates under five inches in thickness;

Three and one-half cents per pound of all plates of the thickness of five inches and more, up to, but not including, eight inches; and

2¼ cents per pound of all plates of the thickness of eight inches and upwards; it being understood that the weights of the plates upon which the prices herein named are to be computed shall be the weight of each plate as accepted in accordance with the provisions of the aforesaid contract of November 20, 1890.

The party of the second part will hold and save the party of the first part harmless from and against all and every demand or demands, of any nature or kind, for or on account of infringement of patented rights in using and employing the aforesaid Harvey process in the treatment of armor plates in accordance with the terms of this agreement.

This agreement is made subject to all the covenants, conditions, and provisions of the aforesaid contract of November 20, 1890, so far as not repugnant thereto, and shall be deemed and taken as forming a part of said contract with the like operation and effect as if incorporated therein.

In witness whereof the respective parties hereto have hereunto set their hands and seals this eighth day of April, A. D. 1893.

Signed, sealed, and delivered in the presence of—

{ SEAL OF THE CARNEGIE STEEL CO., LIMITED. } THE CARNEGIE STEEL CO., LIMITED.
By JOHN G. A. LEISHMAN, *Vice-Chairman*,
By H. N. CURRY, *Manager*,
And by F. T. F. LOVEJOY, *Manager*.

Attest:
F. T. LOVEJOY, *Secretary*.

THE UNITED STATES.
By HILARY A. HERBERT,
As Secretary of the Navy.

SAM. C. LEMLY,
Judge-Advocate-General.
As to HILARY A. HERBERT,
Secretary of the Navy.

{ SEAL OF NAVY DEPARTMENT. }

EXHIBIT F.

Memorandum of an agreement of two parts made and entered into this twelfth day of April, A. D. 1893, by and between the Harvey Steel Company, a corporation created under the laws of the State of New Jersey and doing business in said State, represented by the president of said corporation, of the one part (hereinafter called the party of the first part), and the United States, represented by the Secretary of the Navy, of the other part (hereinafter called the party of the second part).

Whereas the party of the first part is the owner of all and singular the patented rights in and to a certain process, known as the Harvey process, for the treatment of armor plates for use in the construction of vessels, and of the exclusive right to the use and employment of armor plates manufactured according to said process, as particularly set forth in letters patent of the United States, No. 460262, issued September 29, 1891, to Hayward A. Harvey, of Orange, New Jersey, for certain improvements in decrementally hardened armor plates and in the art of manufacturing the same; and

Whereas an agreement was made and entered into, under date of March 21, 1892, by and between the aforesaid parties hereto, whereby the party of the first part granted to the party of the second part the right to use and employ the Harvey process aforesaid in the manufacture of armor-plates for certain vessels of the Navy therein named, for the sum of $75,000, to be paid by the party of the second part to the party of the first part as royalty therefor, and as utilized, at the rate of one-half of one cent per pound of the finished plate, the party of the first part guaranteeing that the cost to the party of the second part of the application of said process to armor plates should not exceed nine-tenths of one cent per pound of the finished plate, provided the application of such process should be made under the direction of the party of the first part; and

Whereas the party of the second part has entered into an agreement with the Bethlehem Iron Company, of South Bethlehem, Pennsylvania, for the treatment, according to said Harvey process, of armor plates for certain of the vessels mentioned in the aforesaid agreement at a price in excess of the limit guaranteed by the party of the first part hereto, as aforesaid, the application of such process not to be made under the direction of said party of the first part:

Now, therefore, the aforesaid agreement of March 21, 1892, is hereby cancelled and annulled, and it is hereby mutually understood, covenanted, and agreed by and between the parties hereto, that for and in consideration of the premises, and in consideration of the sum of ninety-six thousand and fifty-six dollars and forty-six cents ($96,056.46), to be paid by the party of the second part to the party of the first part as royalty, the party of the second part may, upon the terms hereinafter stated, use and employ, in the treatment of armor-plates manufactured or to be manufactured for all naval vessels the construction of which was authorized by Congress up to and including July 19, 1892, the aforesaid Harvey process, and may use and employ the armor-plates for said vessels manufactured according to said process, it being understood, however, that ten per cent of said sum shall be withheld by the party of the second part until, upon the receipt of the formulæ for the compounds used and employed in the application of the Harvey process, said process shall have been tried and found to be efficient and, in the judgment of the Secretary of the Navy, of satisfactory value.

The party of the first part hereby further covenants and agrees that it will hold and save harmless, and at its own risk and expense, defend, the United States from and against all and every demand or demands for the payment of any sum or sums of money in excess of the aforesaid sum of $96,056.46 as royalty for or on account of the use and employment of said process in the treatment of armor plates under this agreement, or of the armor plates manufactured in accordance therewith, and from and against all and every demand or demands for or on account of any infringement or alleged infringement of patented rights appertaining to said process or plates.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that the party of the second part shall have the right to use and employ the aforesaid Harvey process in the treatment of armor plates for vessels which have been since July 19, 1892, or which may hereafter be, authorized by Congress, and to use and employ armor plates for such vessels manufactured according to said process, paying therefor to the party of the first part a royalty of one-half of one cent per pound of the finished plate.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that the party of the first part shall furnish full and complete information regarding the composition of the compounds employed in the Harvey process, and the application of the same, and shall impart to the party of the second part all information concerning any and all improvements which said party of the first part may, at any time in the future, make in or upon said process as covered by the aforesaid letters patent, and that the party of the second part shall have the right to adopt and use and employ any or all of such improvements in said process, and to use the armor plates manufactured in accordance therewith under the terms of this agreement, without the payment of any compensation or royalty therefor to the party of the first part, in addition to that to be paid as hereinbefore stipulated.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that this agreement shall not, nor shall any interest herein, be transferred by the party of the first part to any other person or persons, and that no Member of or Delegate to Congress, officer of the Navy, or any person holding any office or appointment under the Navy Department, shall be admitted to any share or part of this agreement or to any benefit to arise therefrom; but this stipulation, so far as it relates to Members of or Delegates to Congress, shall not be considered to extend to this agreement, it being made with an incorporated company.

It is hereby further mutually understood, covenanted, and agreed by and between the parties hereto, that if, at any time, the party of the first part shall fail to comply with and fulfill the terms, conditions, and requirements of this agreement on its part, the party of the second part may demand and recover from the party of the first part, on account of such failure, and as liquidated damages, a sum of money equal to the penalty of the bond accompanying this agreement; and that in case it should at any time be judicially decided that the party of the first part is not legally entitled, under the letters patent aforesaid, to own and control the exclusive right to the use and employment of said process and the decrementally hardened armor plates produced thereunder, as set forth in the letters patent aforesaid, then the payment of royalty under the terms of this agreement shall cease, and all sums of money due the party of the first part from the party of the second part, as royalty for the use and employment of said process, and armor plates, as aforesaid, shall become the property of the party of the second part.

Cost of Indiana's armor—Continued.

GUN PROTECTION.

	Tons.	Cost per ton.	Total cost.
Barbettes, 17-inch	777.80	$575.00	$447,242.[illegible]
Barbettes, 6-inch	41.68	575.00	23,963.[illegible]
Barbettes, 8-inch	111.96	575.00	64,378.[illegible]
Sponsons, 4-inch	38.57	600.00	23,144.[illegible]
Turrets, 6-inch	141.36	575.00	81,295.[illegible]
Turrets, 15-inch	393.49	575.00	226,276.[illegible]
Sponsons, 2-inch	2.75	725.00	1,996.[illegible]
Total	1,507.59		868,296.[illegible]
Introduction of nickel in 969.99 tons			10,863.[illegible]
Harveyizing turrets, 6-inch, 96.06 tons			7,531.[illegible]
Harveyizing turrets, 15-inch, 321.23 tons			16,189.[illegible]
Royalties for use of Harvey process			4,673.[illegible]
Cost of nickel oxide in 1,507.59 tons			46,735.[illegible]
			954,290.[illegible]

SUMMARY.

	Tons.	Cost.
Hull protection	1,171.79	$715,611.04
Gun protection	1,507.59	954,290.75
Total	2,679.38	1,669,901.79

Average cost per ton, $623.

Estimated cost of armor for Kearsarge.

HULL PROTECTION.

	Tons.	Cost per ton.	Total cost.
Side, 4 to 16.5 inch	831	$470.00	$390,570.00
Armor bulkheads, 10 to 12 inch	30	525.00	15,750.00
Casemate, 5 inch	308	450.00	138,600.00
Conning tower, 10 inch	50	525.00	30,975.00
Conning-tower tubes, 7 inch	16	525.00	8,400.00
Total	1,244		584,295.00
Cost of nickel oxide			24,382.40
Harveyizing			67,176.00
Royalties for use of Harvey process (if paid)			13,928.80
			689,782.20

GUN PROTECTION.

	Tons.	Cost per ton.	Total cost.
Turrets, 9 to 17 inch	671	$525.00	$352,275.00
Barbettes, 12.5 to 15 inch	568	525.00	298,200.00
5-inch gun protection, 6 inches thick	214	450.00	96,300.00
Splinter bulkheads, 2 inch	81	450.00	36,450.00
	1,534		783,225.00
Cost of nickel oxide			30,066.40
Harveyizing			78,462.00
Royalties for use of Harvey process (if paid)			16,273.60
			908,027.00

Estimated cost of armor for Kearsarge—Continued.

SUMMARY.

	Tons.	Cost.
Hull protection	1,244	$689,782.20
Gun protection	1,534	908,027.00
	2,778	1,597,809.20

Average cost per ton, $575.

NOTE.—Of the 2,679.38 tons of armor for the *Indiana*, only 1,053.38 tons were Harveyized, whereas with the *Kearsarge's* armor it is proposed to Harveyize all but 81 tons; and yet the cost of the armor for this ship will be $48 per ton less than that for the *Indiana*.

From the foregoing table it will be seen that the actual average cost per ton of the armor for the *Indiana*, one of the new battle ships, is $623; and that the estimated average cost per ton of the armor for the *Kearsarge*, one of the new battle ships now under contract (and the other will be just the same), is $575. The latter estimate is based upon the bids which, as I explained to the committee, the two armor firms have heretofore indicated they would put in for the armor for these ships.

Additional information received since the report in compliance with the Senate resolution above quoted from is to the effect that one of the English armor manufacturing firms delivered during 1894 6,000 tons of armor at about $550 per ton.

Later and additional information in regard to French contracts for latest battle-ship armor is that, although the contract price is not yet definitely settled, it will be from $540.40 to $550.05 per ton, the contracts to go to four different French firms.

The price paid by France to the owners of the Harvey patent, as published, was $28.90 per metric tonne ($29.36 per U. S. ton) for plates over 6.3 inches in thickness, and $14.50 per metric tonne ($14.73 per U. S. ton) for plates of, and less than, 6.3 inches (16 centimeters).

The French firm at Creusot received the contract for the armor of the Swedish coast defense vessel *Odin*. The appropriation was so low that first-class surface hardened steel could not be secured, hence the contract was made for a lower quality equivalent in resistance to good ordinary Le Creusot steel. Price $312 to $318 per ton.

Prices paid by a foreign Government to—

Bethlehem Iron Company.—1894–95. 1,700 tons Harvey nickel steel for one ship and untreated nickel steel for another, at a cost of $249 for the former; the second about 2 per cent less per ton.

December, 1895. Contract for about 1,200 to 1,500 tons Harvey armor for a new battleship at $525.58 per ton.

Carnegie Company.—October, 1895. Contract for 1,000 to 1,300 tons Harvey armor at a cost of $535.32 per ton.

The officers of the Carnegie Company state that they received 105 pounds and 11 shillings per ton for this armor, being manufactured for a foreign Government, and the officers of the Bethlehem Company state that they received 107 pounds for the armor they are manufacturing for foreign Governments.

From the above culculations, made very carefully by the Bureau of Ordnance, and averaging the prices of the armor for the *Kearsarge* and *Kentucky* at $575 per ton, it would appear that these firms are asking

of the United States Government some forty dollars per ton mo
they ask of a foreign Government for similar work. It is sug
however, that an accurate conclusion as to whether the price
charged the United States Government are too high can not be
at without taking into consideration the nature of the tests t
the armor is to be subjected and the requirements of the
Governments. The officials of the Carnegie and Bethlehem co
might be called upon to state the nature of the requirements in
cases. The effort of this Department has been from the begi
secure the very best possible armor. Its requirements have t
always been very rigid, the rules requiring in all cases certain d
etc. The Department is not able to state what were the requi
under contracts made by these firms with foreign Governments

Fifth. As to the Corey patent, I was asked whether there w
ing in the Bureau of Ordnance a question of the use of this pa
reforging armor. The statement was made by Senator Chand
such a question was now pending in the Bureau of Ordnan
attention was called to the fact that in his opinion this patent w
I find, upon inquiry, that the proposition to use the process e
in this patent is before the Bureau of Ordnance, and, further,
matter of having the armor hereafter to be manufactured made
ing to this processs has been heretofore brought to my attentio
Bureau of Ordnance, but in the conferences between the Chief
Bureau and myself nothing was said about the process being
by a patent in favor of Mr. Corey or of anyone else. I fi
Captain Sampson did not mention the fact that this process w
ered by a patent, because, first, in his opinion, the process is no
patentable, having been used before, and, second, no claim h
been made for any royalty to be paid by the Government for th
such process. The process claimed to be covered by the Corey
is that alluded to during my answers to the committee on Sa
last, viz, the reheating and rerolling down to thinner shapes o
already Harveyed. Whatever rights Mr. Corey may hereafter c
foreign countries by reason his patent on this process is not a
of importance to the United States Government, inasmuch as
freely given to the Carnegie Company and also to the Bethleher
pany the right to use it in the manufacture of armor for this G
ment, and the armor is now and will hereafter be manufactu
these firms without royalty, provided the Government shall ha
armor manufactured in future according to that method, as
expects to do.

Sixth. Although not requested to do so, I have thought it pr
add a statement as to the reason why, in the memorandum furnis
from the Bureau of Ordnance and left with the committee cont
a list of officers owning patents, etc., the name of Captain Sa
was not mentioned as a joint owner with Lieutenant Ackerman
tain improvements in the manufacture of face-hardening armor.
tain Sampson states that this memorandum was made out by hi
clerk for the purpose of giving the names of the owners of thes
ents. It appears that the patent was granted on the 28th of Ja
1895, nearly a year since, and that on the next day, the 29th o
uary, Lieutenant Ackerman, to whom Captain Sampson had trans
all his interest, gave a license to the Government, upon paying
the cost of the patent, including attorneys' fees, to use the p
without royalty, and this license was recorded on March 19th,
with the Commissioner of Patents. The license and the certific

record, from which it will appear that Captain Sampson has not now, and did not have at the time the memorandum alluded to was made out, any interest whatever in this process either at home or abroad, are as follows:

"LICENSE.

"Whereas William T. Sampson, captain U. S. Navy, and Albert A. Ackerman, lieutenant U. S. Navy, have jointly invented certain improvements in the manufacture of hard-faced armor, for which they have filed an application for letters patent of the United States, serially numbered 530240, filed November 28, 1894, which application was allowed January 28, 1895; and whereas the said Sampson has transferred all his right, title, and interest in and to the said invention, and in and to the letters patent to be obtained therefor to the said Ackerman; and whereas the Bureau of Ordnance of the Navy Department is or may be desirous of manufacturing armor plate in accordance with the said invention;

"Now, therefore, to all whom it may concern be it known, that for and in consideration of one hundred dollars ($100), the same being the actual cost of patenting the said invention, I, the said Albert A. Ackerman, do hereby grant to the Bureau of Ordnance of the Navy Department, and all the officers and employees connected therewith, the right to manufacture, sell, and use armor plates constructed in accordance with the said invention, as described in the specification forming part of the aforesaid application for letters patent.

"Signed at Washington, D. C., this 29th day of January, 1895.

"A. A. ACKERMAN."

"In presence of—
"PHILIP R. ALGER,
"C. S. SPERRY,
Witnesses."

"Received for record Mch. 19th, 1895, and recorded in Liber F 51, page 304, of transfers of patents.

"In testimony whereof I have caused the seal of the Patent Office to be hereunto affixed.

"JOHN S. SEYMOUR,
"*Commissioner of Patents.*

"(Exd. M. G. S.)"

I have the honor to be, very respectfully,

H. A. HERBERT,
Secretary.

NEW YORK SUPREME COURT EVIDENCE.

Senator CHANDLER. Mr. Chairman, I have procured a copy of the record in the case of James R. Davies *v.* The Harvey Steel Company, tried in the New York supreme court for Kings County before Hon. William J. Gaynor and a jury November 12 and 13, 1895. I offer it in evidence as showing, first, Commander Folger's connection with the enlargement of the Harvey patent so as to include the hardening of armor plate, and also as showing his employment after he left the Bureau of Ordnance in January, 1893, by the Harvey Company, on a salary of $5,000 a year and $20,000 of stock, which the secretary of the company swears he considers worth par.

Senator HALE. You do not put in the papers from the Patent Office!

Senator CHANDLER. I have been unable to send for various records of the Patent Office and to ask that one of the examiners might come here, for the reason that I have not had access to the exhibits to Secretary Herbert's testimony so as to prepare a call for the evidence that would be pertinent.

Senator HALE. Secretary Herbert's testimony having just come in.

Senator CHANDLER. It having been returned this morning to the committee.

The record submitted by Senator Chandler is as follows:

New York supreme court, Kings County.

James R. Davies *v.* The Harvey Steel Company, before Hon. William J. Gaynor and a jury.

BROOKLYN, N. Y., *November 12 and 13, 1895.*

Appearances: Messrs. Hess, Townsend & McClelland, for plaintiff; Messrs. Wilson & Wallis, for defendant.

Plaintiff offers in evidence a certificate of incorporation of the defendant, dated November, 1886.

(Marked Exhibit 1.)

It is admitted that in the year 1890 Hayward A. Harvey was the president of the defendant.

HERVEY C. CALKIN, being called as a witness on behalf of the plaintiff and duly sworn, testified as follows:

Direct examination by Mr. TOWNSEND:

Q. Where do you reside?—A. New York City.

Q. What is your business?—A. Steam fitting, plumbing, etc.; connected with that business.

Q. You were at one time a member of the United States Congress?—A. Some years ago; yes, sir.

Q. During what years?—A. I was elected in 1888 and served one term in the Congress.

Q. Do you know the plaintiff in this action, Mr. James R. Davies?—A. I do.

Q. How long have you known him?—A. Thirty years.

Recess.

After recess.

Same witness:

Q. Did you know Mr. Hayward A. Harvey in his lifetime?—A. I did.

Q. How long had you known him?—A. Well, about twenty years; I suppose about twenty-six years ago since I knew him first.

Q. At one time did you have a conversation with him in regard to the Harvey process of hardening steel?—A. I did.

Q. And bringing that process to the attention of the Navy Department?

(Objected to as not binding upon the defendant, as incompetent and immaterial. Objection overruled. Exception. Not answered.)

Q. State when that conversation was.—A. In the early part of the year 1890.

Q. And where was it?—A. It was at the Astor House, in New York City.

Q. State what that conversation was.

(Same objection. Objection overruled. Exception.)

A. Mr. Harvey asked me if I would take hold of the matter for him and bring it before the Navy Department at Washington; that matter was his process of Harveyized steel for plates and other uses; for hardening iron; and after quite a conversation with him I told him it would be impossible for me to do it. He said to me: "Mr. Calkin, I will compensate you liberally; I would like very much for you to take hold of the matter." I stated to him that I could not do so; that my business was such that I could not leave it; that the course of my own business was such that I could not afford to leave it to look after his matter, even if the compensation be very liberal. And then I said to him: "You know our friend Davies. He is acquainted in Washington, possibly as well as I am with the Department, and I think that he would attend to that matter for you probably as well as myself." "Well," he says to me, "I had not thought of him before, because I had you in my mind, and I would like very much to have you do it." I declined taking any part in the matter, and from that we made an appointment. I made an appointment with him to meet him at Mr. Davies's office.

Mr. WALLIS. I move to strike out this testimony as incompetent against this defendant.

(Motion denied. Exception.)

Q. When was that appointment made for?—A. Either for the next day or the day after; within a day or two.

Q. Where was Mr. Davies's office at that time?—A. On Park Row, right opposite the Astor House.

Q. Did you see Mr. Harvey at Mr. Davies's office in pursuance of that appointment?—A. I did.

Q. Who were present at that time?—A. Mr. Harvey, Mr. Davies, and myself.

Q. State what was said between you and Mr. Harvey and Mr. Davies at that time.

(Objected to as immaterial and incompetent on the same ground. Objection overruled. Exception.)

A. I had previously told Mr. Davies that I had spoken to Mr. Harvey about the matter before meeting him there, and told him of the appointment.

(Objected to.)

Q. You met him there?—A. When we met we talked about the process, and about its great advantages, and if successful the great value it would be to his corporation, and also to the country; and he said that he was willing to pay liberally to anyone who would secure the introduction of it, or the trial of it before the Navy Department.

Q. Did he explain at that time the nature of the process?—A. Yes, sir.

Q. Did he have samples of the steel?—A. He had samples of the steel—small samples of it at that time.

Q. They were exhibited and examined?—A. Yes, sir.

Q. Go on.—A. And then the compensation was talked about, and he said as I stated, that it was to be a great advantage to his concern, and worth a great deal of money to have the Government adopt it, and he was willing to pay liberally; and we talked about the compensation, and I said that "I would not take hold of it for less than 10 per cent of the amount you receive from the Government and my expenses paid," and I said "Mr. Davies ought to receive the same amount." And he said in my presence that if Mr. Davies secured his introduction to the Navy Department he would compensate him at that rate.

Mr. WALLIS. I move to strike out this testimony as not in anyway binding upon the company.

(Motion denied. Exception.)

Q. Was anything said in this conversation in reference to there being a corporation organized under this process?

(Objected to as leading. Objection overruled. Exception.)

(Not answered.)

Q. Go on and state if anything further was said in that conversation.

(Not answered.)

The COURT. Was not this corporation in existence at this time?

Q. Was anything further said in that conversation in regard to this process?—A. He stated to me emphatically that that corporation was formed, and that he was the president of it, and that they expected to make a great success of the Harveyized steel. I do not remember any other conversation.

(Motion to strike out as incompetent and immaterial denied. Exception.)

Q. Did you subsequently see Mr. Harvey and have conversation with him in regard to the same matter?—A. I saw him afterwards in Mr. Davies's office.

Q. Can you state the time?—A. I can not. It was probably a month after that, or six weeks; I can not state the time.

Q. What then occurred?—A. He seemed satisfied.

(Stricken out by consent.)

Q. What was said?

(Objected to as incompetent and immaterial. Objection overruled. Exception.)

A. He said that he was satisfied with what Mr. Davies was doing. Of course I felt interested in the matter, and talked it over with him. He felt satisfied and making good progress.

(Last part of answer stricken out by order of the court. Plaintiff excepts.)

Cross-examination by Mr. WALLIS:

Q. Mr. Calkin, you say that in this first conversation Mr. Harvey described this process. What process did he describe?—A. The process of hardening steel with a process of his own for making that steel impregnable.

Q. Tell us what he said on that subject.—A. I could not explain it to you; that is some years ago. I did not charge my mind with it; I did not see his patents and claims, and could not explain it.

Q. Did not it strike you as a process of considerable importance?—A. It did, decidedly.

Q. And still you have no recollection of anything said in relation to the process?—A. I could not explain to you at this moment anything about it, because I did not charge my mind with it.

Q. Have you any interest with Mr. Davies in this matter?—A. None whatever.

Q. Did it strike you that the Department to Mr. Davies was a more important matter than the development of this process that you have spoken of?—A. I had nothing to do with it; it was not my business, and I had enough of my own matters to charge my mind with without charging it with that.

Q. (Repeated.)—A. No, sir; it did not strike me.

HAYWARD A. HARVEY, being called as a witness on behalf of the plaintiff and duly sworn, testified as follows:

Direct examination by Mr. TOWNSEND:

Q. What is your business?—A. I am connected with the Harvey Steel Company at present as general sales agent of the company.

Q. How long have you been connected with it?—A. Since 1891.

Q. You are a son of Hayward A. Harvey, to whom reference has been made, who was president of the company at one time, are you not?—A. I am.

Q. Were you connected with the company at the same time your father was?—A. I was.

Q. In what capacity in 1891?—A. I had charge of the experimental work of the company at that time.

Q. In what capacity were you connected with the company in 1890?—A. I was at home from college at that time, simply in the works learning the business of the company. My connection with the company is a practical one.

Q. Were you accustomed to write letters for your father in the year 1890 at his dictation?—A. At times, yes.

Q. I show you a letter dated July 4, 1890, and ask you if that is in the handwriting of your father, Hayward A. Harvey?—A. That is his writing.

(Marked Exhibit 1 for identification.)

Q. I show you a letter under date of August 6, 1890, and ask you if you know in whose handwriting that letter is?—A. That letter is in the handwriting of Mr. Henry A. Burge.

Q. What connection, if any, did he have with the Harvey Steel Company?—A. A salesman of the company.

Q. Do you know where he is now?—A. He is connected with D. J. Gautier, at No. 114 John street.

Q. Was he accustomed to write letters at the dictation of your father?—A. At times.

Q. How is that letter signed; will you state?—A. "Yours, truly, H. A. Harvey, H."

Q. That "H"——A. Stands for Henry.

(Marked Exhibit 2 for identification.)

Q. I hand you the letter under date of August 28, 1890, and ask you in whose handwriting that letter is?—A. This letter is interlined; Capt. Charles Halsey.

Q. Who was he, and what was his connection with the company?—A. He is connected with the company, and looks after the books of the company.

Q. Is he at present connected with the company?—A. He is at present connected with the company.

Q. And was he in the year 1890 connected with the company at the date of that?—A. To the best of my knowledge.

Q. In what capacity?—A. Having charge of the books.

Q. By whom is the letter signed?—A. Joseph H. Dickinson, manager.

Q. Was he at that time manager of the company?—A. He was.

Q. Is he still connected with the company?—A. He is.

(Marked Exhibit 3 for identification.)

Q. I show you a letter under date of September 30, 1890, and ask you in whose handwriting that letter is?—A. That letter is in the handwriting of Mr. Bruge.

Q. And how is it signed?—A. "H. A. Harvey, dictated."

Q. Any initial?—A. No initial, but "dictated."

(Marked Exhibit 4 for identification.)

Q. That is the same man who signed one of the firm letters, is it not?—A. Yes, sir.

Q. I show you a letter under date of January 5, 1891, and ask you in whose handwriting that is, and how it is signed?—A. That is in Mr. Bruge's writing, signed "H. A. Harvey. H," meaning Henry.

(Marked Exhibit 5 for identification.)

Q. I also show you a letter under date of January 7, 1891.—A. That is the writing of the same gentleman and signed "H. A. Harvey. H."

(Marked Exhibit 6 for identification.)

Q. Also letter of January 31, 1891.—A. That is in the writing of Captain Halsey, and is signed "H. A. Harvey, per J. H. D." (Joseph H. Dickinson.)

Q. Mr. Dickinson was the manager?—A. Yes, sir.

(Marked Exhibit 7 for identification.)

Q. Also the letter under date of March 19, 1891.—A. That is in the writing of Mr. Bruge, signed "H. A. Harvey. H."

(Marked Exhibit 8 for identification.)

Q. Also letter of April 19, 1891.—A. The writing of the same person, signed with the same initial.

(Marked Exhibit 9 for identification.)

Q. Also the letter of August 19, 1891.—A. That was written by Captain Halsey, signed "H. A. Harvey, per C. H." (Charles Hawley).

(Marked Exhibit 10 for identification.)

Q. A letter under date of December 28, 1891.—A. Signed "H. A. Harvey;" signed by himself.

(Marked Exhibit 11 for identification.)

Q. Was that letter dictated to you by your father?—A. Presumably it was.

Q. And signed by his instructions?—A. Signed by his instructions, on March 7, 1892. Probably dictated to Mr. Bruge, and signed "H."

Q. The second was in typewriting, was it not?—A. It was; nevertheless, Mr. Bruge was accustomed to sign that way.

(Marked Exhibit 12 for identification.)

Q. March 16, 1893.—A. I was instructed to write this letter and signed it myself. Father was ill at the time.

(Marked Exhibit 13 for identification.)

Q. And the letter of April 12, 1893.—A. I was instructed to write this letter, and signed it.

Q. You signed it yourself?—A. Yes, sir.

(Marked Exhibit 13 for identification.)

Q. All these letters which are shown to you are upon the letter heads of the Harvey Steel Company, are they not?—A. They are.

Q. They are written and signed by gentlemen who at that time were connected with the company either in its administrative capacity or as clerks?—A. They were.

Q. When did your father die?—A. August 28, 1893.

Q. Do you know a man by the name of Theodore Sturges?—A. I do.

Q. Do you know what his business was in 1890?—A. He was the secretary and treasurer of the Harvey Steel Company I know; also connected with several other corporations.

No cross-examination.

JAMES R. DAVIES, plaintiff, being called as a witness on his own behalf and duly sworn, testified as follows:

Direct examination by Mr. TOWNSEND:

Q. You are the plaintiff in this action?—A. I am, sir.

Q. Did you know Mr. Hayward A. Harvey in his lifetime?—A. I did, sir.

Q. How long had you known him?—A. Between forty-five and fifty years.

Q. Had you been up to and prior to 1890, and including the year 1890, on intimate terms with him?—A. Almost like a brother.

Q. In the year 1890 did you have a conversation with him in regard to Harveyized steel, and the introduction of that in the Navy Department?—A. I did.

Q. When?—A. I think it was the first week in January, 1890.

Q. Where?—A. The first interview I had with him was in Wall street, nearly opposite No. 152 Wall street. He met me in the street and asked where he could find Mr. Hervey C. Calkin. I told him No. 177 Christopher street, or, if he desired it, I would have him come down to my office, No. 13 Park Row.

Q. Did you have any conversation with him at that time in regard to this steel?—A. No.

Q. When did you have such a conversation with him?—A. In my office, after he had had an interview with Mr. Calkin.

Q. Who were present at that time?—A. Mr. Harvey, Mr. Calkin, and myself.

Q. State to the jury what was said at that time.

(Objected to on the same ground, as immaterial, irrelevant, and that Mr. Harvey had no authority to bind the company by any arrangement he might make with this witness. Objection overruled. Exception.)

A. Mr. Calkin had an interview with Mr. Hayward A. Harvey in my office in my presence, and the statements of Mr. Calkin I heard. Mr. Harvey then said to me, "James, will you go to Washington and represent our company? I am the president of a small company and I am anxious to have it presented to the Navy Department to have a trial of it; Mr. Calkin can not go." I told him that I would, and would do the best I could. He had then samples of the steel; he explained the process to me. I told him that I was not a mechanic and did not want to know anything about it, because I could not explain it when I got to Washington, or to people. He said that the company would pay me well for it; he talked about getting me 10 per cent. I said, "Hayward, I shall leave it to you; if I succeed, I have no doubt but that you will take care of my interest." I took samples of the steel and went to Washington the next day and called upon the Secretary——

Q. One moment; have you now stated all that you can remember in regard to that conversation?—A. So far as I recollect.

Mr. WALLIS. I move to strike out the evidence, as not binding on the defendant.

(Motion denied. Exception.)

Q. You say that Mr. Harvey brought there samples of the steel?—A. He did, sir.

Q. Were they left with you?—A. I took them to Washington with me.

Q. The next day you went to Washington, you said?—A. I think I went to Washington the next day, or within a day or two; I think the next day.

Q. State what you did in Washington in regard to bringing this steel and the process to the attention of the Navy Department.

(Objected to as immaterial. Objection overruled. Exception.)

A. I called upon Mr. Tracy, who was then Secretary of the Navy, and stated that I represented a new process for hardening steel.

(Objected to on the ground that the witness is not shown to have been employed by the defendant company, and that any conversation between General Tracy and the witness is not binding upon the defendant. Objection overruled. Exception.)

Mr. Tracy told me he had nothing to do with it; that I would have to go to the Chief of the Ordnance Bureau, and bring the matter before him. He asked me, "Are you acquainted with Commodore Folger?" I told him that I was not, but that I would get some of the heads of bureaus whom I did know to introduce me to Commodore Folger. I then called on Commodore Theodore Wilson, Chief of the Construction Bureau, an old friend of mine, who took me and introduced me to Commodore Folger and left me with him. I had a considerable conversation with Commodore Folger on the subject of it, and left him. I called upon him several times again—two, or three, or four, or five, I don't know how many—and asked him how he was getting along with it; and in the meantime he had connected with Mr. Harvey and talked with Mr. Harvey himself.

(Last part of answer objected to and stricken out by consent.)

Q. Whom last did you see, if anyone, in connection with the Navy Department?—A. In regard to the steel?

Q. In regard to the steel, yes?—A. Mr. Wilson, the naval constructor.

Q, Who was he?—A. Theodore Wilson, Commodore Wilson, the Chief of the Construction Bureau at that time.

Q. You had been acquainted with him for how long?—A. About thirty years; I knew him when he was an apprentice boy in the Brooklyn Navy-Yard.

Q. Whom last did you see?—A. Mr. Melville, Chief of the Bureau of Engineering.

Q. Had you known him prior to that time?—A. I had, but only a few years.

(Motion to strike out, as not included in the bill of particulars. Objection overruled. Exception.)

Q. Did you have a conversation with Commodore Wilson in regard to this steel and its adoption by the Navy Department?—A. I most assuredly did.

Q. What was that conversation?

(Same objection, ruling, and exception.)

A. General conversation; that if Mr. Harvey could get a trial by the Navy Department, and that steel would do what he said it would, that it would be of great benefit to the Navy, and I wanted his influence and wanted his help as chief Constructor of the Navy.

Q. His help for what purpose, to accomplish what?—A. For plating a vessel, the armor of vessels, and as he was a member of the board of five, I think it is now five, where all new inventions are sent for their approval or disapproval.

Q. You called on Mr. Melville; what office did he hold?—A. Chief Engineer, Chief of the Bureau of Construction, engineering.

Q. What conversation did you have with him?—A. General conversation in regard to the usefullness of the steel.

(Same objection, ruling, and exception.)

Q. What officers connected with the Navy Department did you see?—A. I went to the navy-yard and saw Captain O'Neil afterwards, once or twice.

(Objected to as improper, immaterial, and not within the case. Objection overruled. Exception.)

Q. What conversation did you have with Mr. O'Neil?—A. He saw the Chief of the Ordnance Department, I think.

(Same objection, ruling, and exception.)

The COURT. Did this result in the Navy Department accepting this steel?

Mr. TOWNSEND. Yes, sir.

Mr. WALLIS. That is one of the points in the case.

Mr. TOWNSEND. We shall show that.

The COURT. I want to know what counsel claims?

Mr. TOWNSEND. Yes, sir; we do claim that.

Q. Go on and state the conversation with Captain O'Neil.—A. The object of my visit to him was——

(Objected to.)

Q. Don't state your object, state the conversation.—A. I wanted to use his influence to have the steel adopted for the manufacture of tools.

Q. Was anything said about a test being made of the steel?—A. With any of the officers?

Q. Yes.—A. Most assuredly.

Q. With whom?—A. With Commodore Folger in the first place.

Q. With whom else?—A. Nobody else; him alone; it was his province.

Q. With what other persons did you have conversation with regard to having a test made of the steel?—A. I don't remember now any particular one.

Q. Did you see any one else in this matter connected with the Navy Department?—A. Besides the Secretary, Commodore Folger.

Q. I want all you saw?—A. Commodore Wilson, Commodore Melville, Captain O'Neil, and the Secretary; I don't know—I can not recall anybody else. They were the most important ones.

Q. Do you know whether a test was made of this steel?—A. Not from my own personal seeing. I know that there was a test there.

(Motion to strike out made and granted.)

Q. Do you know whether a furnace was built at the navy-yard for the purpose?—A. I do, for I saw it building, and was there while it was being built.

Q. What was that furnace for?—A. To test a plate that the Department bought in England and brought here to test.

Q. To test this process?—A. To test this process; yes, sir.

Q. And this process, known as the Harvey process, was applied to this plate?—A. It was, in the Washington Navy-Yard.

Q. In this furnace which was constructed for that purpose?—A. That is so, sir.

Q. Where was the factory or furnace of the company?—A. In Newark.

Q. Newark, N. J.?—A. Yes, sir.

Q. Did you at any time visit that factory?—A. I did.

Q. With whom?—A. I went over with and met Mr. Hayward A. Harvey.

Q. At the factory?—A. Yes, sir.

Q. When was that?—A. In January or February, I can not tell the day.

Q. What year was it?—A. 1890.

Q. State what took place there and what was said by Mr. Harvey, if anything.—A. Mr. Harvey took me through the works——

(Objected to as incompetent, that no admission of an officer of the company after the fact is binding upon the company, and as after the alleged contract.)

Q. Did you at any time see Mr. Harvey in the city of Washington?—A. I did.

Q. Can you state on what occasion?—A. He came to see me there three or four times.

Q. Between what dates?—A. Between the 1st of January, 1890, and September 20.

Q. In regard to this——

(Objected to.)

The COURT. Is it the fact in this case that this corporation owned this patent?

Mr. TOWNSEND. Yes, sir.

Mr. WALLIS. Not at this time.

The COURT. It is not proved yet.

By the COURT:

Q. This conversation was where, in the navy-yard at Washington?—A. At the Arlington Hotel in Washington.

Q. I understood you it was at the furnace.—A. I was not at the furnace with Mr. Harvey.

(Objection overruled.)

Q. You went to the factory at Newark, N. J., with Mr. Harvey?—A. I did not go with him there, I met him there.

Q. State what occurred at the factory in regard to this matter with Mr. Harvey.

(Same objection. Objection overruled. Exception.)

A. He showed me through the factory, introduced me to his son, whom I had never seen before; introduced me to Mr. Halsey, whom I had known many years ago, and introduced me to Mr. Dickinson, who was then the manager; showed me the making of the rods of steel.

Q. Did you also have interviews with Mr. Harvey in regard to this matter in the city of Washington?—A. I did, sir.

Q. Between what dates?—A. During the year 1890; I can not tell the dates.

Q. About how many?—A. I should think three or four times with Mr. Harvey.

Q. Did you meet him there by appointment?—A. He generally wrote me that he was coming over, and I would meet him at the hotel in the evening on the arrival of the train.

Q. At these interviews with Mr. Harvey in the city of Washington did he state to you that he had had interviews with any of the officers of the Navy Department?

(Objected to as leading. Objection overruled. Exception.)

A. I think he did; I think he told me that he had met and was talking with Commodore Folger.

Q. You say that you knew Mr. Sturges, who was then the secretary and treasurer of the defendant?—A. I did know him; yes, sir.

Q. How long had you known him?—A. Well, when I was introduced to him, invited to the office by Mr. Harvey by letter asking me to come down and be introduced to Mr. Clark or his people, as he states in the letter——

Q. Where did you see Mr. Sturges first?—A. At No. 52 Wall street, on the invitation of Mr. Harvey.

Q. Did you subsequently see him in the city of Washington?—A. I did, sir.

Q. In regard to the introduction of this steel?—A. I did, sir.

Q. How many times?—A. Twice with Mr. Harvey, I think, and once he was there with his daughters on a visit.

Q. What conversation did you have with Mr. Sturges?

(Objected to.)

Q. Can you tell when this meeting with Mr. Sturges in Washington was?—A. I can not.

Q. About what time?—A. During this summer, when he came over with Mr. Harvey. He came to see how we were getting along. It was general conversation.

Q. Can you state the conversation?—A No; I can not state the conversation.

Q. I show you Exhibit 1 for identification, and ask you if you received that letter?—A. I received that letter on the morning of July 5; that is a letter written by Mr. Harvey himself.

(Offered in evidence. Objected to as only a personal letter six months after this alleged contract, as incompetent, immaterial, and not binding on this defendant. Objection overruled. Marked Exhibit 1.)

Q. I show you Exhibit 2 for identification, and ask you if you received that letter?—A. I received that, sir, at the Riggs House.

Q. When?—A. The next morning after it was mailed.

Q. What is the date of it?—A. August 6.

Q. 1890?—A. Yes, sir.

(Offered in evidence. Objected to on the same ground, and as irrelevant. Objection overruled. Marked Exhibit 2.)

Q. I show you Exhibit 3 for identification, and ask you if you received that letter?

The COURT. Put them all in.

A. I received these letters.

Q. Did you receive all the rest of the letters that have been marked for identification at or about the time they bear date?—A. I don't think there are any defective ones here; I received these letters, sir.

(Offered in evidence. Objected to on the same ground as before, and upon the additional ground that it does not refer to this subject-matter at all, and not involved in this suit.)

The COURT. Connect it in some way.

Q. Look at that letter No. 3 for identification, and state to what it refers.—A. This refers to steel for the purpose of making tools. Mr. Dickinson sent me this, gentlemen, to find out what they bid at the last opening of bids for steel in the Navy Department for the making of tools. As I had the samples there before the Department, he wanted to know what their process was, so as to arrange the process when he put in a bid, when I sent on the blanks.

By the COURT:

Q. Bid for what?—A. Bids for steel for use in the Navy Department throughout the country for making tools.

By Mr. TOWNSEND:

Q. This is the same steel?—A. Yes, sir; only made in rods for making cold chisels, etc.

(Objection. Overruled. Exception. Marked Exhibit No. 3. Exhibit No. 4 for identification offered in evidence. Same objection, ruling, and exception. Marked Exhibit No. 4, now Exhibit No. 6, for identification, offered in evidence. Same objection, and further, that the representation referred to in the last letter, Exhibit No. 4, had ceased.)

The COURT. I don't see that that has any relation to this case; it does not explain anything.

(Plaintiff excepts. Exhibit No. 7, for identification, offered in evidence, dated January 31, 1891. Same objection as before, that it is a personal letter of Mr. Harvey and written months after the termination of the relation, according to the witness's own testimony.)

Mr. TOWNSEND. I will not press that letter just at present.

Q. Did you ever make a request or demand for payment for your services?—A. I did.

Q. To whom?—A. Mr. Hayward A. Harvey.

Q. I show you Exhibit No. 11, for identification, and ask you if that has reference to a request made by you for payment?

(Objected to on the ground that the letter speaks for itself and should not be characterized by the witness; also as incompetent and immaterial. Objection overruled. Exception. Marked Exhibit No. 5.)

Q. Is this letter, Exhibit No. 12 for identification, in answer to a letter written by you?—A. It is, sir.

(Offered in evidence. Objected to as immaterial, incompetent, and written after the contract was made and after the alleged employment had ceased. Objection sustained.)

Q. Upon what matter did you write to Mr. Harvey in your letter of March 4, to which this letter refers?

By the COURT:

Q. By whom is the letter written?—A. By myself, sir.

Q. To whom?—A. To Hayward A. Harvey.

(Objection overruled. Notice to produce also offered in evidence. Marked Exhibits 6 and 7. Plaintiff now calls for the letter from the plaintiff to Hayward A. Harvey of March 4, 1892.)

Mr. WALLIS. It is not in our possession or under our control.

Q. Did you on March 4, 1892, write a letter to Hayward A. Harvey in reference to the matter in this suit?

(Objected to as calling for the contents of a written document.)

A. This is an answer to it.

Q. Will you state what were the contents of that letter?

(Objected to as incompetent and immaterial, as a personal letter to Mr. Harvey individually, and inadmissible.)

The COURT. These letters are all to Mr. Harvey individually. I think I will take it and see what the letter says.

(Defendant excepts.)

A. The letter to which it is an answer was asking to have our matter settled up and our account settled.

By Mr. TOWNSEND:

Q. Your claim for services?—A. That is right; that is it exactly.

By the COURT:

Q. To whom was your letter addressed?—A. All my business was with Mr. Hayward A. Harvey, addressed to him personally.

Mr. WALLIS. I move to exclude the letter on the ground that any statement of the witness is incompetent as against this defendant.

The COURT. I will allow it.

(Defendant excepts.)

By Mr. TOWNSEND:

Q. Have you ever received anything for your services in this matter?—A. Not a farthing.

Q. Did you incur expense in this matter?—A. I should say I did.

Q. In what way, for what purpose?—A. Traveling expenses, expenses incurred there in entertaining even Mr. Harvey and Mr. Sturges when they came to see me.

Q. In 1890 about how many times did you visit the city of Washington on this business?—A. About twenty, as near as I can recollect.

Q. And paid your own expenses every time?—A. I did; every cent.

Q. How much did that amount to?—A. $1,500, $1,600, or $1,700.

Q. State some amount which is within the amount expended by you, which you know was expended by you, whether $10, or $1,000, or $2,000; some amount.—A. One thousand seven hundred dollars, then.

By the COURT:

Q. Did that letter which you mentioned ask for an adjustment of your account?—A. Yes, sir.

Q. With whom?—A. With the company; he represented the company.

(Objected to.)

The COURT. Strike that out. You had better say what that letter contained as near as you can.

Q. State the contents of the letter as near as you can.—A. It was asking to have our accounts adjusted.

By Mr. TOWNSEND:

Q. State the language of it as near as you can.—A. That is an impossibility. The tenor of it is asking him to have our accounts settled.

Q. What account did you refer to?

(Objected to. Objection sustained.)

Q. At that time did you have any other business with Mr. Harvey than this business connected with the Harvey Steel Company?—A. Except the steel business?

Q. Yes.—A. No other business whatever.

Cross-examination by Mr. WALLIS:

Q. Now, Mr. Davies, you say that Mr. Harvey explained to you the process of manufacturing this steel?—A. He did.

Q. And that you went with him to the factory in Newark?—A. I did.

Q. Was this steel being made there at the time?—A. It was.

Q. Did you see it being made there?—A. I did.

Q. How did he explain the process of manufacturing of this steel?—A. He showed me when they took these bars the process of rolling them down, the different sizes.

Q. Was that all there was to it; that was all the process he showed you?—A. That was all I saw.

Q. That was all you saw?—A. That is all.

Q. That was the steel which you took samples of to Washington?—A. I presume so.

Q. Don't you know?—A. I don't know whether that was the steel I saw rolled through those rollers; he told me it was.

Q. Steel made in that way?—A. Yes.

Q. Describe the samples you took to Washington.—A. Three or four inches long.

Q. Bars?—A. Bars; yes, sir.

Q. To make tools with—these were the bars of steel that you showed to Captain O'Neil?—A. At the navy-yard?

Q. Yes.—A. I did, sir.

Q. And those were the bars of steel that you spoke to Commodore Folger about?—A. No, sir; it was a different matter I spoke to him about.

Q. You have made no distinction between them?—A. I have not been asked that—yes, sir.

Q. Did you understand from Mr. Harvey that this steel you have referred to was secured by a patent?—A. Most assuredly I did, sir.

Q. Do you know what patent it was?—A. I do not now recollect it.

Q. At this time in the early part of 1890, when this matter was discussed, this steel that you were interested in with Mr. Harvey was secured by a patent of the United States?—A. Yes, sir; I have his word for it.

Q. You say you had samples of the steel at the Navy Department?—A. Yes, sir.

Q. What were those?—A. The samples I referred to a few moments ago.

Q. The same samples?—A. Yes, sir.

Q. You spoke of having some process applied to some steel in the Washington Navy-Yard in the furnace. Did you see that?—A. I did not.

Mr. WALLIS. I move to strike out the witness's testimony in respect to that.

(Motion denied. Defendant excepts.)

Q. You say that you were acquainted with Commodore Folger?—A. I was when Commodore Wilson introduced me to him.

Q. When was that?—A. I think in January.

Q. Of what year?—A. 1890. I knew him by sight, but had no personal acquaintance with him.

Q. And you say you had no conversation with Commodore Folger in relation to the steel till the United States Government afterwards made a contract with this defendant?—A. I most assuredly did.

Q. Is that also true with reference to the Secretary of the Navy?—A. Yes, sir.

Q. Did you also have similar conversation with the Secretary of the Navy?—A. Using the same phraseology as with Commodore Folger?

Q. Yes.—A. I don't think I did.

Q. Did you have conversation with the Secretary of the Navy upon the same subject?—A. That is it, I did.

Q. And who was the Secretary of the Navy?—A. General Tracy.

Q. Benjamin F. Tracy?—A. That is his name.

Q. Did you have any conversation on the same subject with Commodore Wilson, do you say?—A. I did.

Q. All these conversations were on the same subject—the same steel?—A. Yes, sir.

Q. The steel that you had seen made in Newark?—A. No, I don't say that; don't put words in my mouth.

Q. The steel that you had samples of?—A. I don't say that.

Q. Is it true that the conversations which you say you had with Secretary Tracy, with Commodore Folger, and with Commodore Wilson—did these conversations refer to the steel of which you say you took samples to Washington?—A. Most assuredly, yes, but it was in different shapes; one is plate and the other is bar.

Redirect examination by Mr. TOWNSEND:

Q. Mr. Davies, were these conversations with these officers to which you have referred in reference to Harveyized steel?—A. Yes, sir.

By the COURT:

Q. You say the latter was in the plate form?—A. The conversation

I had with Commodore Folger and Secretary Tracy was in reference to plates to put on armored vessels.

By Mr. WALLIS:

Q. Two kinds you speak of now that you did not speak of in your direct examination; were they made under the same process?—A. I presume so; Mr. Harvey told me so.

Q. Do you know?—A. I don't know anything about it, for I did not see it.

WILLIAM ALLEN SMITH, being called as a witness on behalf of the plaintiff and duly sworn, testified as follows:

Direct examination by Mr. TOWNSEND:

Q. What is your business?—A. I am the secretary and treasurer of the Harvey Steel Company.

Q. And have been for how long a time?—A. Since early in 1893.

Q. You have charge of the finances of that company, have you?—A. I have.

Q. As treasurer?—A. Yes, sir.

Q. You know of a contract made between the company and the United States Government?—A. I do.

Q. Do you know how much money has been received by the Harvey Steel Company under that contract?—A. I do.

Q. How much?

(Objected to as incompetent, immaterial, and that no foundation has been laid for the question.)

By the COURT:

Q. When was the contract made?—A. April 12, 1893.

Q. Was that the first one?—A. No; there was a preceding one, which was abrogated by this one of April 12, 1893.

Q. When was the preceding one made?—A. I think in March, 1892. I don't remember the exact date; not quite a year before, if I remember rightly; it was about March, 1892.

Q. Were these contracts you have mentioned for steel?—A. No; they were not for steel.

Q. Was this money received as consideration for the use by the Government of the patents governing the Harveyized steel?

(Objected to and contracts called for.)

The COURT. Have you the contracts?

Mr. TOWNSEND. I have.

The COURT. Put them in.

Mr. TOWNSEND. I offer in evidence a certified copy of the contract between the United States Government and the Harvey Steel Company; also, a memorandum of the agreement between the Harvey Steel Company, represented by the president of said corporation, on the one part, and the United States Government, represented by the Secretary of the Navy, on the other part, under date of April 12, 1893.

(Objected to as not referring at all on the face of it to anything to which this witness has testified, the contracts showing that it refers to an entirely different thing.)

By the COURT:

Q. Do these patents cover Harveyized steel?—A. There are several patents, your honor; there are several processes. During the time when Mr. Davies had anything to do with this armor plate matter was

not under consideration, it was entirely subsequent to it, and our contract with the Government had nothing to do whatever with the steel which Mr. Davies says he introduced.

Mr. TOWNSEND. I move to strike out what the witness has just stated.

Q. Were there patents at that time?—A. Yes; what we call the low steel patent of January 10, 1888, a process for treating low steel.

Q. Where are these successive patents?—A. We have what we call this low steel patent, dated January 10, 1888, Mr. Harvey's first patent, and he pursued his investigations for his patent for rail for railroads, a patent for a carburizing mixture, and then the armor plate.

Q. What is the difference in making the steel for armor plates and this tool steel?—A. There is a marked difference; I don't understand that I am to give expert testimony, but there is a marked difference.

Q. What is it?—A. In the sequence of the processes, in the way the steel is treated, and the handling of large masses involves necessarily very different treatment from the handling of small masses.

Q. Is that all?—A. There are other differences which I am not competent to testify to. As I said a moment ago, I am not competent to give expert testimony on this.

Mr. TOWNSEND. Assuming that we have shown an agreement for compensation for services in regard to the introduction of this steel, I can not see how it makes any possible difference whether, after the making of this agreement for these services, it made any difference whether there was any improvement in it or not.

By the COURT:

Q. For the manufacture of what kind of steel were covered by this contract?—A. Which contract?

Q. The contract of 1893 and the one it superseded?—A. The patent of September 29, 1891, the Harvey armor plate patent.

Q. What kind of steel is used in that; has it a name?—A. Harveyized steel, certainly; distinctly Harveyized steel—that is, the distinction known as Harveyized steel. Of course any steel made under the Harvey process is called Harveyized.

By Mr. TOWNSEND:

Q. You said that the patents referred to in this contract under date of April 12, 1893, were for the manufacturing of armor plate?—A. Yes, sir, right; it was the process and patents in the manufacture of armor plate.

Q. And the process referred to covered the manufacture of armor plate?—A. Yes.

Q. Known as Harveyized steel?—A. Yes, sir.

Q. The patent that was in existence in 1890 was also for covering the process of manufacturing armor plate, was it not?—A. We call that the low steel patent; Mr. Harvey's original idea.

Q. Did not it cover the process of making armor plate?—A. I am not aware that a pound of armor plate was made under it.

Q. (Repeated.)—A. The word armor plate does not occur in the patent.

Q. Was it for the process of manufacturing armor plate?—A. No.

Q. Was it for the process of manufacturing what was then known as Harveyized steel?—A. I don't know whether it was known as Harveyized steel; it may have been so called at intervals.

Q. Was it known as Harveyized steel at that time?—A. I don't know; I was not connected with the company at that time.

By the COURT:

Q. What is the patent, the process?—A. In this original patent?

Q. Yes.—A. It is a process of producing steel; we call it the low steel process; I am not a technical expert. There is a great difference between——

Q. Is it an improvement—a development—of the original?—A. It covers a great deal more ground than the original patent could possibly have done.

Q. It might be an entirely distinct thing and cover more ground, but is it an improvement—a development—of the original process?—A. It certainly grew out of the original process. May I explain in two words? You could not take the original patent and make armor plate out of it, the original patent.

Mr. TOWNSEND. I introduce this patent in evidence.

(Objected to as immaterial and incompetent. Objection overruled. Exception. Marked Exhibit 7.)

By Mr. TOWNSEND:

Q. How much has been received by the defendant under this contract?

(Objected to as immaterial and incompetent.)

Q. Under this contract or its predecessor?

(Objection renewed and overruled.)

A. $96,056.46, if I remember rightly.

Q. That was paid in one lump sum?—A. No, sir; it was not paid in one lump sum.

Q. Is that all the money that has been received by the defendant for Harveyized steel, or for the use of the process of manufacturing Harveyized steel?—A. Under that contract of April 12, 1893, it is all.

Q. And under any other arrangement or contract?—A. No; it is not all the money we have ever received from the Navy Department. We have sold them small lots of steel, or treated for the Navy Department certain articles of steel, for which we have charged them a price; but these other transactions will amount only to a few hundred dollars.

Q. And these few hundred dollars for the small lots of steel you have so sold or treated for the Navy Department and this $96,056.46 is all the money that has been received by the company from the United States Government?—A. With the exception of about $300, which the United States Government paid us for work done at the Bethlehem Iron Company's works.

Cross-examination by Mr. WALLIS:

Q. Mr. Smith, did the Harvey Steel Company ever enter into a contract with the United States Government or the Navy Department thereof for supplying it with tool steel?

(Objected to as incompetent. Objection overruled.)

A. Not to my knowledge.

Q. Did it at anytime enter into any contract with the Government of the United States or its Navy Department for supplying any steel manufactured at Newark, N. J.?—A. I understand that before my connection with the company some steel was sold to the Navy Department, but I know of no contract relating to such steel.

Q. To what extent were such steels made?—A. A matter of a few hundred dollars.

Q. Those that you have already spoken of?—A. Yes, sir.

Q. These small articles that you say were supplied to the Navy Department, or treated by the defendant for the Navy Department, were they treated under the low steel patent?—A. They were.

Q. And not under the armor-plate patent?—A. Not under the armor-plate patent.

Q. And that is all you know of?—A. Yes, sir.

Q. And that was the patent taken out in 1888?—A. Yes.

Q. Has that patent ever been used in the manufacture of armor?—A. Never to my knowledge.

Q. And the armor is manufactured, as I understand you, under the patent of 1891?—A. September, 1891, is the armor-plate patent.

Q. Exclusively?—A. September, 1891, is the armor-plate patent exclusively.

Mr. TOWNSEND. I will read from the deposition of witnesses in Washington taken under a commission issued by this court, October 2, 1894.

(Deposition of Col. Charles Hayward read to the jury by Mr. Townsend. Mr. Wallis objects to the question as to witness' knowledge concerning who first drew the attention of the officers of the Navy Department to the matter, as incompetent, immaterial, and calling for the conclusion of the witness. Objection overruled. Exception. Motion to strike out the answer to the first interrogatory as irresponsive and immaterial made and denied. Exception. The admission of the answer as to the negotiations with Captain O'Neil at the Ordnance Department objected to. Objection overruled. Exception. Defendant objects to the answer to the last interrogatory. Objection overruled. Exception. Mr. Wallis reads the cross-interrogatories. Mr. Townsend reads the deposition of Theodore G. Wilson, naval constructor. Fifth interrogatory objected to as calling for a conclusion of the witness. Objection overruled. Exception. Motion to strike out the answer made and denied. Exception. Mr. Wallis reads the cross-interrogatories. Mr. Townsend reads the deposition of Lieut. Samuel O. Lemly. Cross-interrogatories read by Mr. Wallis. Mr. Townsend reads the deposition of Phillip Hichborne, naval constructor. Also the deposition of Thomas A. Coakley. The question "Do you know who first called the attention of the Naval Department to the Harveyized steel" objected to as incompetent. Objection overruled. Exception. Answer to interrogatory relative to its introduction in the Navy Department objected to, and motion to strike out made and denied. Exception. Motion to strike out the answer to the last interrogatory as hearsay, not responsive, and incompetent made and granted. Plaintiff excepts. Plaintiff offers in evidence the further agreement. Objected to on the ground that it comes under an entirely different patent. Objection overruled. Exception. Marked Exhibit 8. Deposition just read offered in evidence and marked Exhibit 9.)

Plaintiff rests.

Mr. WALLIS. I move for a nonsuit. Whatever the arrangement was, it was absolutely terminated by the same person who commenced it, in the following September, 1890. There was no contract shown to have been made of any kind with the Navy Department of the United States for this armor plate, which is the basis of this action, in the year 1892, and as a matter of fact the patents which are now shown to be the patent under which the armor plate is manufactured were not in existence at the time these negotiations were said to have taken place between Mr. Harvey and Mr. Davies. That the only possible connection that Mr. Davies is shown to have had with the getting of these contracts with the Navy Department, which were entered into under the second patent, not under the first, is that the contracts with the Navy Department were made about two years after this arrangement that is said to have been made between Mr. Harvey and Mr. Davies. That it is not

shown that Mr. Davies had anything to do with any of the negotiations of the Navy Department. And, further, that it is not shown that Mr. Davies was the agent of the defendant; that it is not shown that anything ever came to the knowledge of the defendant that the directors ever authorized or knew of such a contract.

The COURT. What do you understand the contract between Mr. Davies and Mr. Harvey was?

Mr. WALLIS. The contract, as Mr. Davies states it, is that Mr. Davies undertook to go to Washington and to influence the Navy Department, if possible, to enter into contract relations with the defendant for the Harveyized steel; that, of course, was the steel then manufactured as he states, which was under a patent then existing. He had samples of it which he took down to Washington.

The COURT. Did his compensation depend upon his success?

Mr. WALLIS. Certainly; there is no claim that he was entitled to compensation if he did not succeed.

(Motion denied. Exception.)

Mr. Wallis opens the case to the jury for the defendant.

Hon. BENJAMIN F. TRACY, being called as a witness on behalf of the defendant and duly sworn, testified as follows:

Direct examination by Mr. WALLIS:

Q. General Tracy, in 1890 did you have any connection with the Government of the United States?—A. I did.

Q. What was that?—A. Secretary of the Navy.

Q. And were you such Secretary during the whole of that year?—A. Yes.

Q. Do you know the plaintiff in this action, Mr. James R. Davies?—A. I do.

Q. Did he ever, at any time, have any interview with you in relation to the Harvey process, so called?—A. Well, I could not say that he did not, because Mr. Davies was at the Department from time to time. I remember seeing him at the Department. He may have possibly mentioned the subject to me at sometime, but I do not recollect it, and I have no recollection of any such interview. I know that he was not the first person who called my attention to the Harvey steel.

Q. Who first called your attention to the Harvey steel?—A. Mr. Folger, who was then acting as inspector of ordnance at the Washington Navy-Yard, in charge of the tool shop and heavy guns.

Q. When did he cease to be inspector of ordnance?—A. I can not fix the date. I observed while sitting here that Commodore Wilson testified that he introduced Mr. Davies to Commodore Folger when he was Chief of the Bureau of Ordnance. The Harvey steel was known to the Department, and purchased by the Department, and used by the Department at least, I should say, a year before Mr. Folger became Chief of the Bureau; while he was inspector of ordnance at the Washington Navy-Yard.

Q. Did Mr. Davies ever speak to you about Mr. Harvey?—A. I have no recollection of his so speaking to me, and I did not know that he knew Mr. Harvey. I have no recollection of knowing that he knew Mr. Harvey.

Q. Have you any recollection of Mr. Davies at any time appearing before you as Secretary of the Navy in relation to this Harvey process?—A. I have not.

Q. What is your best recollection on the subject?—A. Well, so many men appeared and casually talked that I can not say that Mr. Davies

never mentioned the subject to me at any time during the time I was Secretary of the Navy. I am very sure that he never had anything that could be called a negotiation with me on the subject, or any talk that made any impression on my mind.

Q. And you say that the first person who called your attention officially to this process was Commodore Folger?—A. Commodore Folger himself.

Q. Or Inspector Folger at that time?—A. He was then Inspector Folger.

Q. When was that, do you remember?—A. I can not fix the dates; I could not fix the date when I appointed him chief of the Bureau; he was inspector of ordnance under Mr. Whitney when I came into office. Captain Siccard was chief of the Bureau and remained such, I should say, well on toward 1891, but I am not certain about that, I can not fix the date, and then Mr. Folger succeeded him. I know that the Department bought the Harvey steel and used it in the navy-yard as tool steel under Mr. Folger as inspector of ordnance, and I know that the suggestion of whether that process could be applied to armor had been made while he was Chief of Ordnance, and I am very confident that the Government had built a furnace in the navy-yard while he was Chief of Ordnance for the purpose of trying that experiment.

Q. What connection, so far as you know, did Mr. Davies have with the building of that furnace?—A. None.

Q. So far as you know what connection had Mr. Davies with the introduction of this armor into the Navy Department?—A. None, so far as I know or ever heard till this litigation.

No cross-examination.

Mr. WALLIS. Now, I will read the deposition of William M. Folger.

(Original offered in evidence and marked Exhibit A.)

Also the decision of the supreme court of the State of New Jersey fixing the law of that State in regard to the power of the president of a corporation.

(Objected to on the ground that the contract being in the State of New York is controlled by the laws of the State of New York.)

The COURT. I will take the decision, subject to the motion to strike it out.

Mr. WALLIS. It is reported in the 8th of Roome, page 98; I read from page 102. [Reading the decision.]

(Counsel for plaintiff moves to strike out for the reasons stated, and that the law of the State is the law of this case.)

Adjourned to Wednesday, November 13, 1895.

BROOKLYN, N. Y., *November 13, 1895.*

Hearing resumed. Same appearances.

WILLIAM ALLEN SMITH, recalled on behalf of defendant, testified further as follows:

By Mr. WALLIS:

Q. Mr. Smith, I believe you stated that you were the secretary of the Harvey Steel Company?—A. I am.

Q. And as such have the custody of its books?—A. I have.

Q. What is this book?—A. The minute book of the Harvey Steel Company.

Q. It contains what?—A. It contains the minutes of the meetings of the board of directors and stockholders, kept from its inception to the present time.

Q. Have you examined that book carefully?—A. I have.

Q. From the beginning of the company to date?—A. I have.

Q. Is there any resolution contained in that book authorizing Mr. Hayward A. Harvey, president of that company, to employ agents to exploit the business of that company in Washington or elsewhere?

(Objected to as incompetent and irrelevant. Objection overruled. Exception.)

A. There is no such resolution.

Q. Is there any resolution contained in that book authorizing the employment of Mr. James R. Davies as an agent of that company?

(Objected to as incompetent, immaterial, and irrelevant. Objection overruled. Exception.)

A. There is no such resolution.

Q. Does the name of James R. Davies anywhere appear in that book?

(Same objection, ruling, and exception.)

A. The name of James R. Davies does not appear in this book.

Q. How long have you been the secretary of that company?—A. Since March, 1893.

Q. And I believe it is in evidence that Mr. Theodore Sturges was the secretary before you were?—A. Mr. L. L. Sturges was the secretary before myself.

Q. For how long?—A. For certainly six or seven months, and before that he was the acting secretary.

Q. During the time you were the secretary of this company did you ever hear of Mr. James R. Davies as representing this company anywhere?—A. Not in anyway.

Q. When did the company first learn of any claim against it by Mr. James R. Davies?

(Objected to as incompetent and irrelevant. Objection sustained. Exception.)

Q. Who received the correspondence of the company during your incumbency of the secretaryship?—A. My impression is that I received all the correspondence from Mr. Davies.

A. The correspondence of the company generally, to whom did it come?—A. It came partly to me and partly to the office in Newark.

Q. Who was in charge of the office in Newark?—A. I am in charge of both offices.

Q. Then it all reached you eventually?—A. It all reached me eventually.

Q. When did any claim first reach you as secretary of the company on behalf of Mr. Davies against the defendant here?

(Objected to as immaterial, irrelevant, and incompetent. Objection overruled. Exception.)

A. I can not give the precise date; it was about a month after Mr. Hayward A. Harvey died. Mr. Harvey died on the 28th of August, 1893, and it was about a month after that—possibly only three weeks after that—when Mr. Davies called to see me and informed me that he had a claim against the Harvey Steel Company for services rendered in Washington. This was the first I had ever heard of any such claim.

Cross-examination by Mr. TOWNSEND:

Q. Mr. Smith, did you ever receive any letters from Mr. Davies?—A. I received one or two letters from Mr. Davies. With the exception—do you mean since I was secretary?

Q. Since you were secretary of the company?—A. One or two letters.

Q. You opened and read them?—A. Yes.

Q. Have you read those letters here?—A. They are here.

Q. Were they in relation to the matter of this suit?—A. There is one letter in relation to this suit.

Q. When was that received?—A. The original letter is here; it was shortly after Mr. Davies called upon me, possibly two weeks after.

Q. Then it was after the death of Mr. Harvey?—A. After the death of Mr. Harvey.

Q. Were you connected with the company in any way during the year 1890?—A. I was not.

Q. You, as secretary and treasurer of the company, have the custody of its books and papers?—A. I have.

Q. There were a quantity of letters produced here yesterday from Mr. Davies; did you bring those?—A. You do not mean those you presented yourself?

Q. No.—A. Those I had in my hands I brought.

Q. How many did you bring?—A. I do not know the precise number; possibly twelve or fifteen letters.

Q. You examined them, did you?—A. Yes.

Q. Running over what dates were those letters?—A. My impression is that the first of those letters was dated somewhere in 1891.

Q. And running from that time down through till shortly before this suit was commenced?—A. Yes.

Q. You brought those letters from the office of the defendant company?—A. I did.

Q. And found them among the papers of the company?—A. Some came from the papers of the company, others came from Mr. Harvey's house in Orange.

Q. Look at this letter under date of August 21, 1893, and state if that is one of the letters you produced.—A. That is one of the letters that I had with me yesterday.

Q. And you brought it from the office of the company?—A. I brought it from the office of the company.

Q. That is dated August 21?—A. August 21, 1893.

Q. Mr. Harvey you say died on August 20?—A. August 28.

(Offered in evidence; objected to as immaterial, having no possible bearing on this case.)

Q. I show you a letter addressed to Mr. William Allen Smith, dated September 18, 1893, and ask you if you received that letter?—A. Yes, sir; I received that letter.

Q. And inclosed in it was this bill under the same date?—A. This bill was inclosed with the letter.

(Bill and letter offered in evidence, and marked Exhibits 10 and 11, without objection.)

Q. You say that you have before you the book of the minutes of the directors?—A. I have.

Q. Can you refer to it and tell how many meetings of the directors were held in the year 1890, prior to September 30?—A. I can in a very few minutes' time.

Q. Please do so.—A. There was a meeting on February 1, February 8, March 25; that is three; April 8 is four. That is all. The next meeting was February 20, 1891. There were four meetings held in the year 1890; the last one was April 8.

Q. Have you read the minutes of those meetings?—A. I have.

Q. And do any of them have reference—is there in those minutes any reference to armor plate or the process of Harveyizing steel?—A. I think not; I do not recall any such.

Q. Do I understand you that the name of Dr. Davies does not appear anywhere in that book?—A. Nowhere in that book; possibly it may occur in the minutes of the meetings after he brought suit, but I think not; certainly not before that.

Q. Prior to the death of Mr. Harvey had you heard the name of Mr. Davies mentioned in connection with the company?—A. No.

Q. Not at all?—A. Not at all.

Q. And you came in the company, you say, in 1893?—A. In 1893.

Q. What time in 1893?—A. I think it was March 29.

Q. Had the company letter books in which was kept copies of the letters written in the year 1890?—A. Yes, sir.

Q. Have you examined the letter books for that year, 1890?—A. I have; I can not say that I have read every letter written by the company in the year 1890, but I have made a general examination of the letter books.

Q. Have you made an examination of the letter book kept at the factory at Newark, N. J.?—A. I have with reference to this particular matter.

Q. Do you find in that letter book copies of any letter addressed to James R. Davies?—A. I do.

Q. During what years?—A. I think they began in 1890.

Q. And those are letters signed by Mr. Harvey in his personal name?—A. Chiefly, yes.

By the COURT:

Q. Is that in the company's letter book?—A. In the company's letter book.

By Mr. TOWNSEND:

Q. Have you the book here?—A. I have.

By the COURT:

Q. Do they embrace the letters which have been read here?—A. Some of them.

By Mr. TOWNSEND:

Q. Will you turn to one of those letters during the year 1890?—A. Here is a letter dated September 30, 1890.

Q. Will you read it, sir?—A. "James R. Davies, esq., Washington, D. C. My Dear Sir: Your favor of Sept. 27th is received. From some information I have received, which I am under obligations not to reveal, nor can I explain at present to you, I am under the necessity to ask you to withdraw for the time being from representing us before the Government. I hope you will not receive this as a personal matter from me, but as emanating from our company, as a matter of policy. I hope to be able after a short time to explain to you, and if matters are satisfactory at Washington we will again renew our joint efforts. Believe me, as ever, your friend, H. A. Harvey."

Q. That is a copy of this letter of September 30, marked Exhibit 4, is it not, read in evidence yesterday?—A. I heard a similar letter read yesterday.

Q. Are there any letters to Mr. Davies in that letter book prior to September 30?—A. Not in this letter book.

Q. Are there any subsequent to September 30?—A. There seems to be three here. Here is a letter of July 5, 1891.

Q. Please read it.—A. "James R. Davies, esq., Washington, D. C. Dear Sir: Your letters and telegrams received and contents noted. I

am glad that you are meeting with such favor with the War Department. We have now gone as far as we can till we can see where we can have the plate made. They are too large for any furnace we have here. We are obliged to wait till we get through with the plate at the navy-yard before we do anything more, as Mr. Dickinson and I will be busy until after that plate is finished; so remain quiet till that is out of the way. I am afraid you were a little premature in inviting these officials till after we have had the test of the plate, when I intend to dine them. I will probably not be down till next week, and then only for a day or two," etc. Ending with "in the meantime I will see you in New York. Yours, truly, H. A. Harvey, H."

Q. What other letter do you find in 1890?—A. "Jan. 7th, 1891. James R. Davies, esq., Washington, D. C. Dear Sir: Yours of the 4th inst. to hand. The requisition from Captain O'Neil will not go through the Department which came directly to us, as already understood, and will be for a small quantity of our new steel adamantine. Yours, truly, H. A. Harvey. H."

Q. What steel does that "adamantine" refer to?—A. I suppose it was the steel the company was making at that time; I was not connected with the company and can not give an exact answer to that.

Q. Do you know of any steel of that name?—I do not.

Q. Have you any other letters during 1891 to James R. Davies; January 31?—A. "Jan. 31st, 1891. James R. Davies, esq., Washington, D. C. Dear Sir: Yours of the 29th at hand. I have not been in Washington since we took the plate out of the furnace. Our tests that we can make are very satisfactory. We are now waiting till the firing takes place, when I will call on you, if you are in Washington at the time. Yours, truly, H. A. Harvey, per J. H. D."

Q. Look under date of March 19.—A. There is no such letter in this book.

Q. In the year 1891?—A. There is no such letter in this book; this reaches to March 16, 1891.

Q. Have you subsequent letter books?—A. I have.

Q. "3, 19, '91." I will not take time to read the letter. Look under the date of April 19, 1891; see if you find a letter there.—A. "3, 19, '91. James R. Davies, esq., New York City. Dear Sir: Your letter came to hand while I was away; so I did not get it till it was too late to see you. Yours, truly, H. A. Harvey, H."

Q. April 13, 1891?—A. "April 13th, 1891, James R. Davies, esq., New York. Dear Sir: I have been unable to see you or answer your letters, as I have been sick in bed. The reason we did not bid on the last proposal was that most of the steel we could not manufacture. This also will prevent us bidding on the gun forgings, as we are not fitted up to do that kind of work. Yours, truly, H. A. Harvey. H."

Q. Who was the president of the company at that time?—A. I am unable to say whether Mr. Harvey was or Mr. B. G. Clark.

Q. Look at the letter and see if Mr. H. A. Clark's name is not erased and a name substituted as president?—A. I see that there is, yes.

Q. Who was president at that time as shown by the letter head?

(Letter objected to. Motion to strike out, it now appearing that Mr. Harvey was not then president of the company.)

The COURT. I will allow it to remain.

(Exception.)

Q. Was E. C. Clark president at that time, April 13, 1891?—A. I judge that he was from that letter head, but if I could consult the minute book a moment I could inform you.

shown that Mr. Davies had anything to do with any of the negotiations of the Navy Department. And, further, that it is not shown that Mr. Davies was the agent of the defendant; that it is not shown that anything ever came to the knowledge of the defendant that the directors ever authorized or knew of such a contract.

The COURT. What do you understand the contract between Mr. Davies and Mr. Harvey was?

Mr. WALLIS. The contract, as Mr. Davies states it, is that Mr. Davies undertook to go to Washington and to influence the Navy Department, if possible, to enter into contract relations with the defendant for the Harveyized steel; that, of course, was the steel then manufactured as he states, which was under a patent then existing. He had samples of it which he took down to Washington.

The COURT. Did his compensation depend upon his success?

Mr. WALLIS. Certainly; there is no claim that he was entitled to compensation if he did not succeed.

(Motion denied. Exception.)

Mr. Wallis opens the case to the jury for the defendant.

Hon. BENJAMIN F. TRACY, being called as a witness on behalf of the defendant and duly sworn, testified as follows:

Direct examination by Mr. WALLIS:

Q. General Tracy, in 1890 did you have any connection with the Government of the United States?—A. I did.

Q. What was that?—A. Secretary of the Navy.

Q. And were you such Secretary during the whole of that year?—A. Yes.

Q. Do you know the plaintiff in this action, Mr. James R. Davies?—A. I do.

Q. Did he ever, at any time, have any interview with you in relation to the Harvey process, so called?—A. Well, I could not say that he did not, because Mr. Davies was at the Department from time to time. I remember seeing him at the Department. He may have possibly mentioned the subject to me at sometime, but I do not recollect it, and I have no recollection of any such interview. I know that he was not the first person who called my attention to the Harvey steel.

Q. Who first called your attention to the Harvey steel?—A. Mr. Folger, who was then acting as inspector of ordnance at the Washington Navy-Yard, in charge of the tool shop and heavy guns.

Q. When did he cease to be inspector of ordnance?—A. I can not fix the date. I observed while sitting here that Commodore Wilson testified that he introduced Mr. Davies to Commodore Folger when he was Chief of the Bureau of Ordnance. The Harvey steel was known to the Department, and purchased by the Department, and used by the Department at least, I should say, a year before Mr. Folger became Chief of the Bureau; while he was inspector of ordnance at the Washington Navy-Yard.

Q. Did Mr. Davies ever speak to you about Mr. Harvey?—A. I have no recollection of his so speaking to me, and I did not know that he knew Mr. Harvey. I have no recollection of knowing that he knew Mr. Harvey.

Q. Have you any recollection of Mr. Davies at any time appearing before you as Secretary of the Navy in relation to this Harvey process?—A. I have not.

Q. What is your best recollection on the subject?—A. Well, so many men appeared and casually talked that I can not say that Mr. Davies

never mentioned the subject to me at any time during the time I was Secretary of the Navy. I am very sure that he never had anything that could be called a negotiation with me on the subject, or any talk that made any impression on my mind.

Q. And you say that the first person who called your attention officially to this process was Commodore Folger?—A. Commodore Folger himself.

Q. Or Inspector Folger at that time?—A. He was then Inspector Folger.

Q. When was that, do you remember?—A. I can not fix the dates; I could not fix the date when I appointed him chief of the Bureau; he was inspector of ordnance under Mr. Whitney when I came into office. Captain Siccard was chief of the Bureau and remained such, I should say, well on toward 1891, but I am not certain about that, I can not fix the date, and then Mr. Folger succeeded him. I know that the Department bought the Harvey steel and used it in the navy-yard as tool steel under Mr. Folger as inspector of ordnance, and I know that the suggestion of whether that process could be applied to armor had been made while he was Chief of Ordnance, and I am very confident that the Government had built a furnace in the navy-yard while he was Chief of Ordnance for the purpose of trying that experiment.

Q. What connection, so far as you know, did Mr. Davies have with the building of that furnace?—A. None.

Q. So far as you know what connection had Mr. Davies with the introduction of this armor into the Navy Department?—A. None, so far as I know or ever heard till this litigation.

No cross-examination.

Mr. WALLIS. Now, I will read the deposition of William M. Folger.

(Original offered in evidence and marked Exhibit A.)

Also the decision of the supreme court of the State of New Jersey fixing the law of that State in regard to the power of the president of a corporation.

(Objected to on the ground that the contract being in the State of New York is controlled by the laws of the State of New York.)

The COURT. I will take the decision, subject to the motion to strike it out.

Mr. WALLIS. It is reported in the 8th of Roome, page 98; I read from page 102. [Reading the decision.]

(Counsel for plaintiff moves to strike out for the reasons stated, and that the law of the State is the law of this case.)

Adjourned to Wednesday, November 13, 1895.

BROOKLYN, N. Y., *November 13, 1895.*

Hearing resumed. Same appearances.

WILLIAM ALLEN SMITH, recalled on behalf of defendant, testified further as follows:

By Mr. WALLIS:

Q. Mr. Smith, I believe you stated that you were the secretary of the Harvey Steel Company?—A. I am.

Q. And as such have the custody of its books?—A. I have.

Q. What is this book?—A. The minute book of the Harvey Steel Company.

Q. It contains what?—A. It contains the minutes of the meetings of the board of directors and stockholders, kept from its inception to the present time.

Q. Have you examined that book carefully?—A. I have.

Q. From the beginning of the company to date?—A. I have.

Q. Is there any resolution contained in that book authorizing Mr. Hayward A. Harvey, president of that company, to employ agents to exploit the business of that company in Washington or elsewhere?

(Objected to as incompetent and irrelevant. Objection overruled. Exception.)

A. There is no such resolution.

Q. Is there any resolution contained in that book authorizing the employment of Mr. James R. Davies as an agent of that company?

(Objected to as incompetent, immaterial, and irrelevant. Objection overruled. Exception.)

A. There is no such resolution.

Q. Does the name of James R. Davies anywhere appear in that book?

(Same objection, ruling, and exception.)

A. The name of James R. Davies does not appear in this book.

Q. How long have you been the secretary of that company?—A. Since March, 1893.

Q. And I believe it is in evidence that Mr. Theodore Sturges was the secretary before you were?—A. Mr. L. L. Sturges was the secretary before myself.

Q. For how long?—A. For certainly six or seven months, and before that he was the acting secretary.

Q. During the time you were the secretary of this company did you ever hear of Mr. James R. Davies as representing this company anywhere?—A. Not in anyway.

Q. When did the company first learn of any claim against it by Mr. James R. Davies?

(Objected to as incompetent and irrelevant. Objection sustained. Exception.)

Q. Who received the correspondence of the company during your incumbency of the secretaryship?—A. My impression is that I received all the correspondence from Mr. Davies.

A. The correspondence of the company generally, to whom did it come?—A. It came partly to me and partly to the office in Newark.

Q. Who was in charge of the office in Newark?—A. I am in charge of both offices.

Q. Then it all reached you eventually?—A. It all reached me eventually.

Q. When did any claim first reach you as secretary of the company on behalf of Mr. Davies against the defendant here?

(Objected to as immaterial, irrelevant, and incompetent. Objection overruled. Exception.)

A. I can not give the precise date; it was about a month after Mr. Hayward A. Harvey died. Mr. Harvey died on the 28th of August, 1893, and it was about a month after that—possibly only three weeks after that—when Mr. Davies called to see me and informed me that he had a claim against the Harvey Steel Company for services rendered in Washington. This was the first I had ever heard of any such claim.

Cross-examination by Mr. TOWNSEND:

Q. Mr. Smith, did you ever receive any letters from Mr. Davies?—A. I received one or two letters from Mr. Davies. With the exception—do you mean since I was secretary?

Q. Since you were secretary of the company?—A. One or two letters.

Q. You opened and read them?—A. Yes.

Q. Have you read those letters here?—A. They are here.

Q. Were they in relation to the matter of this suit?—A. There is one letter in relation to this suit.

Q. When was that received?—A. The original letter is here; it was shortly after Mr. Davies called upon me, possibly two weeks after.

Q. Then it was after the death of Mr. Harvey?—A. After the death of Mr. Harvey.

Q. Were you connected with the company in any way during the year 1890?—A. I was not.

Q. You, as secretary and treasurer of the company, have the custody of its books and papers?—A. I have.

Q. There were a quantity of letters produced here yesterday from Mr. Davies; did you bring those?—A. You do not mean those you presented yourself?

Q. No.—A. Those I had in my hands I brought.

Q. How many did you bring?—A. I do not know the precise number; possibly twelve or fifteen letters.

Q. You examined them, did you?—A. Yes.

Q. Running over what dates were those letters?—A. My impression is that the first of those letters was dated somewhere in 1891.

Q. And running from that time down through till shortly before this suit was commenced?—A. Yes.

Q. You brought those letters from the office of the defendant company?—A. I did.

Q. And found them among the papers of the company?—A. Some came from the papers of the company, others came from Mr. Harvey's house in Orange.

Q. Look at this letter under date of August 21, 1893, and state if that is one of the letters you produced.—A. That is one of the letters that I had with me yesterday.

Q. And you brought it from the office of the company?—A. I brought it from the office of the company.

Q. That is dated August 21?—A. August 21, 1893.

Q. Mr. Harvey you say died on August 20?—A. August 28.

(Offered in evidence; objected to as immaterial, having no possible bearing on this case.)

Q. I show you a letter addressed to Mr. William Allen Smith, dated September 18, 1893, and ask you if you received that letter?—A. Yes, sir; I received that letter.

Q. And inclosed in it was this bill under the same date?—A. This bill was inclosed with the letter.

(Bill and letter offered in evidence, and marked Exhibits 10 and 11, without objection.)

Q. You say that you have before you the book of the minutes of the directors?—A. I have.

Q. Can you refer to it and tell how many meetings of the directors were held in the year 1890, prior to September 30?—A. I can in a very few minutes' time.

Q. Please do so.—A. There was a meeting on February 1, February 8, March 25; that is three; April 8 is four. That is all. The next meeting was February 20, 1891. There were four meetings held in the year 1890; the last one was April 8.

Q. Have you read the minutes of those meetings?—A. I have.

Q. And do any of them have reference—is there in those minutes any reference to armor plate or the process of Harveyizing steel?—A. I think not; I do not recall any such.

Q. Do I understand you that the name of Dr. Davies does not appear anywhere in that book?—A. Nowhere in that book; possibly it may occur in the minutes of the meetings after he brought suit, but I think not; certainly not before that.

Q. Prior to the death of Mr. Harvey had you heard the name of Mr. Davies mentioned in connection with the company?—A. No.

Q. Not at all?—A. Not at all.

Q. And you came in the company, you say, in 1893?—A. In 1893.

Q. What time in 1893?—A. I think it was March 29.

Q. Had the company letter books in which was kept copies of the letters written in the year 1890?—A. Yes, sir.

Q. Have you examined the letter books for that year, 1890?—A. I have; I can not say that I have read every letter written by the company in the year 1890, but I have made a general examination of the letter books.

Q. Have you made an examination of the letter book kept at the factory at Newark, N. J.?—A. I have with reference to this particular matter.

Q. Do you find in that letter book copies of any letter addressed to James R. Davies?—A. I do.

Q. During what years?—A. I think they began in 1890.

Q. And those are letters signed by Mr. Harvey in his personal name?—A. Chiefly, yes.

By the COURT:

Q. Is that in the company's letter book?—A. In the company's letter book.

By Mr. TOWNSEND:

Q. Have you the book here?—A. I have.

By the COURT:

Q. Do they embrace the letters which have been read here?—A. Some of them.

By Mr. TOWNSEND:

Q. Will you turn to one of those letters during the year 1890?—A. Here is a letter dated September 30, 1890.

Q. Will you read it, sir?—A. "James R. Davies, esq., Washington, D. C. My Dear Sir: Your favor of Sept. 27th is received. From some information I have received, which I am under obligations not to reveal, nor can I explain at present to you, I am under the necessity to ask you to withdraw for the time being from representing us before the Government. I hope you will not receive this as a personal matter from me, but as emanating from our company, as a matter of policy. I hope to be able after a short time to explain to you, and if matters are satisfactory at Washington we will again renew our joint efforts. Believe me, as ever, your friend, H. A. Harvey."

Q. That is a copy of this letter of September 30, marked Exhibit 4, is it not, read in evidence yesterday?—A. I heard a similar letter read yesterday.

Q. Are there any letters to Mr. Davies in that letter book prior to September 30?—A. Not in this letter book.

Q. Are there any subsequent to September 30?—A. There seems to be three here. Here is a letter of July 5, 1891.

Q. Please read it.—A. "James R. Davies, esq., Washington, D. C. Dear Sir: Your letters and telegrams received and contents noted. I

am glad that you are meeting with such favor with the War Department. We have now gone as far as we can till we can see where we can have the plate made. They are too large for any furnace we have here. We are obliged to wait till we get through with the plate at the navy-yard before we do anything more, as Mr. Dickinson and I will be busy until after that plate is finished; so remain quiet till that is out of the way. I am afraid you were a little premature in inviting these officials till after we have had the test of the plate, when I intend to dine them. I will probably not be down till next week, and then only for a day or two," etc. Ending with "in the meantime I will see you in New York. Yours, truly, H. A. Harvey, H."

Q. What other letter do you find in 1890?—A. "Jan. 7th, 1891. James R. Davies, esq., Washington, D. C. Dear Sir: Yours of the 4th inst. to hand. The requisition from Captain O'Neil will not go through the Department which came directly to us, as already understood, and will be for a small quantity of our new steel adamantine. Yours, truly, H. A. Harvey. H."

Q. What steel does that "adamantine" refer to?—A. I suppose it was the steel the company was making at that time; I was not connected with the company and can not give an exact answer to that.

Q. Do you know of any steel of that name?—I do not.

Q. Have you any other letters during 1891 to James R. Davies; January 31?—A. "Jan. 31st, 1891. James R. Davies, esq., Washington, D. C. Dear Sir: Yours of the 29th at hand. I have not been in Washington since we took the plate out of the furnace. Our tests that we can make are very satisfactory. We are now waiting till the firing takes place, when I will call on you, if you are in Washington at the time. Yours, truly, H. A. Harvey, per J. H. D."

Q. Look under date of March 19.—A. There is no such letter in this book.

Q. In the year 1891?—A. There is no such letter in this book; this reaches to March 16, 1891.

Q. Have you subsequent letter books?—A. I have.

Q. "3, 19, '91." I will not take time to read the letter. Look under the date of April 19, 1891; see if you find a letter there.—A. "3, 19, '91. James R. Davies, esq., New York City. Dear Sir: Your letter came to hand while I was away; so I did not get it till it was too late to see you. Yours, truly, H. A. Harvey, H."

Q. April 13, 1891?—A. "April 13th, 1891, James R. Davies, esq., New York. Dear Sir: I have been unable to see you or answer your letters, as I have been sick in bed. The reason we did not bid on the last proposal was that most of the steel we could not manufacture. This also will prevent us bidding on the gun forgings, as we are not fitted up to do that kind of work. Yours, truly, H. A. Harvey. H."

Q. Who was the president of the company at that time?—A. I am unable to say whether Mr. Harvey was or Mr. B. G. Clark.

Q. Look at the letter and see if Mr. H. A. Clark's name is not erased and a name substituted as president?—A. I see that there is, yes.

Q. Who was president at that time as shown by the letter head?

(Letter objected to. Motion to strike out, it now appearing that Mr. Harvey was not then president of the company.)

The COURT. I will allow it to remain.

(Exception.)

Q. Was E. C. Clark president at that time, April 13, 1891?—A. I judge that he was from that letter head, but if I could consult the minute book a moment I could inform you.

Q. Look under date of August 19, 1891.—A. "Aug. 19th, 1891, ames R. Davies, esq., No. 13 Park Row, New York."

(Objected to as simply a letter of Mr. Harvey, who it now appears as not at that time an officer of the company. Objection overruled. xception.)

A. (Continued.) "James R. Davies, esq., No. 13 Park Row, New York: ear Sir: Your favor is received. There is nothing you have done, but ie difficulty is with me. I have been knocked out for repairs, and had drop work, or I would soon have been beyond repairing, so I kept vay from all work. I am now on the up grade. There is nothing to with the Government till after the big test, which will come off about ie first of October. We are treating large plates at Pittsburg and ethlehem. It has taken a long time to build these large furnaces and ppliances. Yours truly, H. A. Harvey, per C. H."

Q. Now, under date of December 28, 1891?—A. That is all that I ave in this book.

Q. Turn, now, to the index of the book and see how many letters dur- ng the time of the use of that letter-book appear upon that, addressed o Mr. James R. Davies.—A. Three.

Q. Only three?—A. Yes, sir.

Q. You have read more than that from it?—A. Only three letters in his book.

Q. Look at the book for December, 1891; look at the index, please, nd then look at the last?—A. No. 6 letter book is the one following iat I have just read from.

Q. All these letters that you have read are upon the letter book of e defendant company?—A. They are copied in that book.

Q. Do you bring that from the office of the company?—A. From the i ce of the company.

Q. Were you the secretary and treasurer of the company at the ne referred to by Mr. Folger in his deposition, when he says that was employed by the company?—A. What is the date of the position?

Q. Do you know of Commodore Folger being employed by the mpany?—A. I do.

Q. Was that during the time you were secretary and treasurer of he company?—A. His employment was during part of that time.

Q. Do you know when he was first employed?—A. It was early in 893. I can not give the precise date.

Q. How long did he remain in the employ of the company?—A. It was about—I think he remained in the employment of the company till he fall of 1893. I can not give the precise date.

Q. During that time he went in behalf of the company to England nd to Europe?—A. He went to England and to Europe, and was harged with a message on behalf of the company while on his visit to Europe.

Q. And was under pay from the company at that time?—A. Under he pay of the company.

Q. Look at the book of minutes and see if you can tell where the reso- ution employing him can be found.—A. I have found the resolution.

Q. Read it.—A. Under what date?

Q. January 10, 1893; minutes of the meeting of the board of direct- rs; read it.—A. "The president reported that he had arranged with Commodore William M. Folger to be retained by this company as con- ulting engineer on a salary of $5,000 per annum from January 1, 1893, nd on motion of Mr. Hine it was resolved that the action of the presi-

dent in relation thereto be, and the same is hereby, approved and confirmed."

Q. Was that salary paid to him in money?—A. Paid to him in money.

Q. Have you the stock book of the company here?—A. I have not.

Q. Do you know when Commodore Folger became a stockholder of the company?—A. I can not give the precise date, but it was some time after I became secretary of the company.

Q. About when was that, then?—A. I became secretary, I think, March 29, 1893, and this may have been a month afterward.

Q. He was not in the employ of the company at that time?—A. He was in the employ of the company at that time.

Q. Is he still in the employ of the company?—A. He is not.

Q. How long did that employment continue?—A. Till, I think, somewhere into the fall of 1893. I can not give the precise date.

Q. Now, a whole year then?—A. It was not quite a year.

Q. He is still a stockholder, is he?—A. He is.

Q. How much stock does he hold?—A. Two hundred shares.

Q. What is the par value of the stock?—A. One hundred dollars.

By Mr. WALLIS:

Q. Mr. Smith, will you look at the book I hand you, minutes of April 8, 1890; that is a minute of what?—A. A board of directors' meeting held April 8, 1890, read and approved.

Q. What is the date of that?—A. February 20, 1891.

Q. Does it appear by these minutes that an election of officers was held at that time?—A. It appears that Mr. Harvey resigned as president of the company February 20, 1891, and that Mr. B. G. Clark was elected president.

Q. How long did Mr. Clark continue to be president?—A. He was elected president again February 20, 1892, and retained the office of president till his death which occurred——

Q. August 12, 1892, was it not?—A. Sometime in August, 1892.

Q. And during that time Mr. Clark was president of that company?—A. During that time Mr. Clark was the president of the company.

Mr. WALLIS. I move to strike from the record all the personal letters of H. A. Harvey which have been put in between February 20, 1891, and August, 1892, because it now appears that at that time he was not the president of the company, and therefore his personal letters have no bearing upon this case, and can not bind the company.

Q. During this time was Mr. Harvey a director of the company?—A. He was.

Q. Was he intimately connected with the business of the company during this time?—A. Well, I was not secretary and treasurer at that time.

Q. Do you know?—A. I suppose that he was.

(Motion renewed.)

The COURT. What letters are they?

Q. Was he reelected president again?—A. In the later years, yes.

Q. What time was he reelected president of the company?—A. October 31, 1892.

By Mr. WALLIS:

Q. And continued president till when?—A. Till the time of his death.

Mr. WALLIS. August, 1893.

(Motion renewed.)

The COURT. I think I will allow them to stand.
(Exception.)

By Mr. TOWNSEND:

Q. Do you know what the relation of Mr. Harvey to the company was during the time when he was the president?—A. He may have been called general manager. He was at all events closely connected with the company.

Q. Did he attend to the correspondence for the company?—A. I judge that he did, to some extent.

Q. You have spoken of some stock issued to Commodore Folger; how was that stock paid for?—A. I don't know.

Q. If it had been paid for in cash, in money, you would have known it, would you not?—A. That stock was transferred by Mr. Harvey to Mr. Folger.

Q. Not directly from the company?—A. Not from the company.

Q. So that that stock was before its transfer the private stock of Mr. Harvey, you think?—A. Exactly.

Q. Then it was not given to him in consideration of his services to the company?—A. I don't know about that.

Q. What was the value of that stock at the time of its transfer to Mr. Folger?—A. I can not give that, sir.

Q. What is its present value?—A. It is very difficult to say.

Q. Worth par, is it not?—A. I should say about par, but it is a very difficult thing to tell that; there have been very few transfers of the stock.

EDWIN W. HINE, being called as a witness on behalf of the defendant and duly sworn, testified as follows:

Direct examination by Mr. WALLIS:

Q. Where do you reside?—A. Orange, N. J.

Q. Are you a director of the defendant, the Harvey Steel Company?—A. Yes, sir.

Q. How long have you been such?—A. Since its early history; I think about 1890; the records will show. Perhaps Mr. Smith can revive my memory; five or six years or more.

Q. You have attended the meetings of the board during that time?—A. I think the records will show that I have attended all of them.

Q. You have attended all the meetings of the board?—A. I think so.

Q. Was the question of the employment of Mr. Davies as an agent of the defendant ever brought before the board of directors while you were a member?

(Objected to as incompetent, immaterial, and irrelevant, and not the best evidence. Objection overruled. Exception.)

A. Never.

Q. Did you, while you were a member of that board, ever hear of Mr. Davies in connection with the company at all?

(Same objection, ruling, and exception.)

A. Never in connection with the meetings of the board of directors of the company.

Q. Did you ever hear of him in any other way as an agent representing the company?—A. Never as representing the company; no, sir.

Q. Who were your associates on the board of directors in 1890, do you remember?—A. Mr. Clark and Mr. Sturges.

Q. Mr. Harvey?—A. Mr. Pine, Mr. Harvey, and myself; five of us.

Q. Where is Mr. Clark?—A. Dead.
Q. Where is Mr. Pine?—A. Dead.
Q. Where is Mr. Harvey?—A. Dead.
Q. And Mr. Sturges?—A. Dead.
Q. You are the only survivor of the board of 1890?—A. Yes, sir.

Cross-examination by Mr. TOWNSEND:

Q. Mr. Hine, do you know Mr. Davies personally?—A. No, sir; I can not say that I do; I recognize him here; I met him in Washington at the Arlington Hotel in the year 1890, I think, and was introduced to him by Mr. Harvey.

Q. You were down there at that time with business connected with the company?—A. Yes, sir; Mr. Harvey and I were down at the navy-yard at the time the plate was being treated there.

Q. Mr. Harvey was there on the same business?—A. Yes, sir.

Q. You then met Mr. Davies and had conference with him?—A. Mr. Harvey had a consultation with him; I did not join in the conversation at all.

Q. But you did see him in consultation with Mr. Harvey?—A. Well, hypothetically, yes; I was not in the conversation at all; I saw Mr. Harvey and Mr. Davies in conversation.

Q. Did you go to the navy-yard with Mr. Harvey?—A. Yes, sir.
Q. Did Mr. Davies go with you?—A. No, sir.
Q. Had you ever heard of Mr. Davies before that time?—A. No.
Q. Never heard his name mentioned?—A. No, sir.

Q. What time in 1890 was that?—A. My memory does not serve me in the matter, but it was the time the first plate was treated at the navy-yard and taken out of the furnace; in the spring of 1890, I think.

Q. Did you see Mr. Davies in Washington after that?—A. No, sir.

Q. Did you hear his name mentioned after that in connection with the business of the company?—A. The day Mr. Harvey presented me——

Q. After that?—A. Not after that day; no.

Q. Did Mr. Harvey then say to you at that interview at Washington that Mr. Davies was trying to advance the interests of the company in the Navy Department?—A. He said he wanted to, but that he did not want his services; he did not require him.

Q. He said he would not do it?—A. Mr. Harvey said then that all Mr. Davies could do for him had already been done, and he did not require his services.

Q. I show you the letter, Exhibit 4, under date of September 30, 1890; did you ever see that letter or a copy of it before?—A. No, sir.

Q. Do you know anything about the circumstances under which that letter was written?—A. No, sir.

Q. Do you know who instigated the writing of it?—A. I do not.

Q. You have attended, you say, all the meetings of the company?—A. I think the records will show that I have attended all the meetings of the company; yes.

Q. Have you been connected with the business in any other way than simply attending the meetings of the directors?—A. That is all.

Q. Where?—A. In America, at our works at Newark; at the Bethlehem Iron Company, Pensylvania; at the Homestead Works of Mr. Carnegie, the steel works at Homestead. In England, at the works of Messrs. Beardmore & Co., Glasgow, and in consultation at the works of John Brown & Co., Limited, Sheffield. In France, at the works of Chat-

tilon and Commentry, at Montlecon; at the works of St. Chamond, St. Chamond; at the works of Marril Frères, at Rive-de-Gier. In Germany I have been in consultation at the Dullengen Works, at Dullengen, and there met the engineers from Krupp. In Austria I have done consultation work at the Witkowitz, at Witkowitz.

Q. You are thoroughly familiar with this process?—A. I feel that I am.

Q. The low steel process, was that the first patent that was in operation?—A. The low steel process, patent No. 376194, was patented in 1888 or 1889; I believe 1888.

(Paper shown witness.)

Q. What is that the patent of?

(Objected to as immaterial, incompetent, and irrelevant. Objection overruled. Exception.)

A. I recognize that as a certified copy of the low steel patent.

(Offered in evidence and marked Exhibit B.)

Q. Under this patent what kind of steels are manufactured?—A. Under this patent, largely tool steel and file steel.

Q. Did you manufacture under that patent any armor steel?—A. Never.

Q. Have you ever examined any of the books of the company?—A. Oh, yes.

Q. Have you ever examined their letter books?—A. No; I think not. I don't think my business ever occasioned my looking at the letter books.

Q. Did you know before to-day of the writing of these letters which have been read in evidence and are found on the letter books of the company?—A. I think that after the suit was commenced Mr. Smith told me there was such a letter in existence; either I have heard it read before or saw it; I think Mr. Smith gave me the contents of it.

Q. You were a large stockholder in the company?—A. I can not consider myself a large stockholder in the company.

Q. Are you a relative of Mr. Harvey?—A. No, sir.

HAYWARD A. HARVEY, being recalled for defendant, testified further as follows:

By Mr. WALLIS:

Q. You have already been examined. How long have you been connected with the defendant, The Harvey Steel Company?—A. Permanently since 1891, but during the summer of 1889 and 1890 I was in their works, learning the business, gaining practical knowledge.

Q. Have you informed yourself as to the nature of these patented processes?—A. I have carefully read the patents, and think I am thoroughly informed on them.

Q. You have practically applied the patents?—A. I have.

Q. Frequently?—A. Frequently.

Q. Did you under that patent manufacture any steel for the United States Navy?—A. Tool steel.

Q. To the extent of $200 or $300, as already testified?—A. Exactly so.

Q. Could armor have been manufactured under that patent?—A. Not at all, sir.

Q. Was the invention secured by that patent the one referred to in the contract with the United States Government which has been put in evidence?—A. In no sense at all, sir.

Q. When did your father first take out the patent on the armor?—A. That is patent No. 46262, bearing date 1891.

(Paper shown witness.)

Q. Is this that patent or a certified copy of it?—A. I recognize this as a certified copy of that patent.

(Offered in evidence and marked Exhibit C.)

Q. This is, I understand, the patent under which the contract was made with the Government of the United States?—A. It was, sir.

Q. do you manufacture tool steel under that patent?—A. We could not.

Q. Or file steel?—A. We could not, sir.

Q. The patents, then, are of two radical different kinds?—A. Yes, sir.

Q. The only thing in common is that they both have reference to a——A. In carburizing; that is all.

Q. From 1890 down, what was your official position in that company?—A. I first had charge of the experimental work, then acting superintendent, superintendent, and sales agent of the company.

Q. Were you intimate with the business affairs of the company?—A. As superintendent of the company I had charge of the correspondence relating to the works.

Q. Did you have anything to do with these negotiations in Washington?—A. No, sir.

Q. Did you ever during your connection with the company hear of Mr. Davies, the plaintiff, or his being in the employ of the company in any way?—A. No, sir.

Cross-examination by Mr. TOWNSEND:

Q. Mr. Harvey, you were connected with the company in 1890?—A. During the summer of 1890.

Q. In July, 1890?—A. Yes, sir.

Q. In the use of what you speak of as tool steel, or file steel, was there any process of firing necessary, experimental firing in Washington?—A. Define your word, please.

By the COURT:

Q. They built a furnace there to test.—A. What?

Q. Could it have been used for this tool iron, file iron?—A. The furnace could have been for the purpose.

By Mr. TOWNSEND:

Q. Where?—A. Washington.

Q. I read you a sentence from Exhibit 1, a letter under date of July 4, 1890, which was signed by your father personally: "The firing was most satisfactory; no penetration or cracks; crushing projectiles all to atoms." Does that sentence refer to tool steel or file steel?—A. It does not; it refers to the ballistic test, one armor plate.

Q. Does that refer to the steel used for armor plate?—A. Yes.

By Mr. WALLIS:

Q. What do you say it refers to?—A. The ballistic test on armor plate at Annapolis.

By Mr. TOWNSEND:

Q. Do you know that in the year 1890 a furnace was erected in the navy-yard for the purpose of testing some steel?—A. A furnace was erected there for treating some steel.

Q. Treating steel for what purpose?—A. Some projectiles were

treated in the furnace, and subsequently I believe the plate was treated in it—was Harveyized in it, I should say.

Q. That was in the year 1890?—A. Late in 1890 and early in 1891.

Q. Before the issuing of this last patent which has been put in evidence?—A. A few months, probably.

Q. Then you were experimenting, or the company was experimenting in making armor plate under the first patent which is put in evidence during the year 1890?—A. No, sir; never, sir.

Q. Never tried to make armor plate under that patent?—A. That would be absolutely impossible.

Q. Was the attempt ever made?—A. No, sir.

Q. How do you know it would be impossible, then?—A. As a practical man.

Q. Then, what was the purpose of the building of this furnace at the navy-yard in Washington?—A. To treat an armor plate in.

Q. Under the Harveyized process?—A. As shown in patent No. 46262.

Q. You have said it was before the issuing of that patent.

The COURT. We all understand that. The idea existed before the patent.

By Mr. WALLIS:

Q. The trial at Annapolis was in anticipation of this last patent?—A. Yes, sir.

Q. And had nothing to do with the old low-steel patent?—A. Nothing at all.

Defendant rests.

JAMES R. DAVIES, plaintiff, recalled on his own behalf in rebuttal, testified further as follows:

By Mr. TOWNSEND:

Q. I read to you the answer of Commodore Folger to the second cross-interrogatory: "I have no recollection about having any conversation, at any time, with Mr. Davies in regard to the Harvey process. The only conversation I had with Mr. Davies that I remember distinctly, and only its nature makes it distinct, was when he said that he knew Secretary Tracy very intimately, and if ever I wanted anything accomplished he could assist me with the Secretary." Did you make that statement to Commodore Folger?—A. Part of it; part of it is not true.

Q. What part was true?—A. That I knew Secretary Tracy.

Q. That is true?—A. That is true.

Q. You did know him at that time?—A. Certainly I did.

Q. Is it true that you stated to Commodore Folger that if ever he wanted anything accomplished you could assist him with the Secretary?—A. I did.

Q. Did you have any other business with the Navy Department during the year 1890 than this connected with the Harvey Steel Company?

(Objected to as incompetent. Objection overruled. Exception.)

A. I did not.

Testimony closed.

Mr. WALLIS. I move, now, for the direction of a verdict for the defendant on the ground that it appears now affirmatively upon the whole case that there was no employment of Mr. Davies by the defendant; that there was no authority in Mr. Harvey, the president, to make such

employment, and upon the further ground that it appears affirmatively in the case that Mr. Davies had nothing whatever to do with patenting this contract with the United States Government, which is the subject of this action.

(Motion denied. Exception.)

Mr. Wallis sums up for the defendant.

Mr. Townsend sums up for the plaintiff.

JUDGE'S CHARGE.

Gaynor, J.

GENTLEMEN OF THE JURY: The plaintiff claims that he was employed by the Harvey Steel Company to call the attention of the United States Government to their process of making steel, and he sues for services which he claims to have rendered under that contract.

In order that the plaintiff may recover, gentlemen, you must find upon the evidence that he was employed by the company. It is not enough that he was employed by Mr. Harvey, who happened at the time to be the president of the company; but that he may recover against the company you must find that the employment was by the company itself, and that the services were rendered for the company itself. Now, to ascertain what the fact is in that respect—whether he was employed by the company or not—you must resort to the acts proved here and to the correspondence. I charge you that it was not necessary that there should be a resolution of the board of directors of this company in order that the plaintiff might be legally employed by the company. A corporation has to act through agents.

The agents created by law for all purposes, I may say, are the directors of the company. They have power to do all that pertains to the company. But there are many things done by corporations not done by resolution of the company, but that nevertheless are in law done by and for the company, and for which the company is responsible. The president of the company, the general manager of the company, the officers of the company, by what they do from day to day, by what they are recognized by the company as doing and having authority to do, may have authority from the company for that purpose, or it may be by subsequent ratification by the company. It might be that the duties of the president and the power of the president and the power of the general manager were never defined by resolution of the board of directors, and yet, being the president, being the general manager, and doing the business of the company, and being recognized by the board of directors, and therefore by the company for that purpose, what such an officer does within the powers thus conferred upon him, by recognition or by practice, or by the course of business, what he does within those limits for the company are the acts of the company and bind the company. So you are to take all these things introduced here, the letters which have been read from the letter-book of the company, and all the correspondence, coupled with the acts of all the parties concerned, and say whether this was an employment, if there was one, by Mr. Harvey individually, or whether he was doing this thing for the company, and whether he had the power to do it for the company.

You have had the letter-book of the company produced, in which certain letters are found written by Mr. Harvey to the plaintiff. Now, I charge you that it was not necessary that he should have signed at the foot of the letter as president; it was not necessary that he should have

referred to his official capacity; that if he was acting for the company, and acting within his powers for the company he would bind it. It also appears before you, or at all events there is some evidence before you, that Mr. Harvey himself was at Washington exploiting these processes, or this process, whichever it is, and calling the attention of the Government to it, or at all events dealing with the Government in some way in relation to this matter. Was he representing the company? Was it within his province to represent the company in that matter, and, if so, from the correspondence and from all the facts before you, was he competent to call in somebody to aid him at Washington, lawyer or layman? And if he so called in and employed this plaintiff on behalf of the company, from all the acts and from these transactions from beginning to end, you are to say whether he acted for the company and within his power. If you pass that point and find that the plaintiff was employed by the company, your next question is, Did he render any service for the company? If he did, what was it and what was the value of it?

There is a claim put forth by the defense which you must consider, and consider carefully whether the employment of the plaintiff, if there was an employment of the plaintiff by the company, extended beyond the process referred to or contained in the letters patent granted in 1888, or did his employment starting with that, and with the tool steel, also by the course of business and by natural development as they went on, embrace also the additional process or additions made to the original process, whichever it was, for the making of these armor plates out of steel, and did he serve the company in that respect? Was he employed to serve it? If confined to the tool steel his compensation might amount to very little—would amount to very little, comparatively. If you find that it extended also to armor plate and find compensation for that, it would be more. But I leave that entirely to you upon the facts, to say whether it covered only the orignal process of tool steel and file steel, or whether it covered also the process for making armor plates.

The time of the patent for armor plate has been put in. It seems to have been taken out after the letter terminating the employment of the plaintiff was written. But still the question remains whether the process was being exploited at the time; whether they were calling the attention of the Government to it, and whether it was being exploited and used, or at least whether they were trying to utilize or exploit it before the letters patent were actually signed in the Patent Office. That would not make any material difference, if you so find that fact to be. That would bring you to the question, if you pass these points, of what the plaintiff is entitled to recover. Upon that I can only say that he would be entitled to recover what you find from the evidence his services were justly and conservatively worth to the company.

Counsel for defendant requests the court to charge the jury as follows:

1. The president of defendant had no power, simply by virtue of his office, to appoint the plaintiff its agent to introduce the Harvey steel to the Navy Department. Unless the jury find from the evidence that he was authorized to do so by the defendant's directors, or that they afterwards ratified the arrangement said to have been made between Mr. Harvey and the plaintiff, their verdict must be for the defendant.

(Charged.)

2. There being no evidence that the defendant's directors had any knowledge of the alleged arrangements between Harvey and Davies, the acceptance by defendant of the contract with the United States,

even if such contract was the result of the plaintiff's efforts, would not give the plaintiff a right of action against the defendant, and the plaintiff can not, therefore, recover in this action.

(Refused other than as charged.)

3. It appearing that the contract with the Navy Department was made more than eighteen months after the plaintiff's alleged employment by Harvey had terminated, his recovery must be confined, if he is entitled to recovery at all, to 10 per cent on the $200 or $300 worth of tool or file steel sold to the Navy.

The COURT. Yes; if his employment did not embrace the other, that is so.

(Exception.)

4. That there is no evidence that the plaintiff was instrumental in bringing about the contract with the Navy Department, and he can not recover any compensation from the defendant measured by the amount paid on that contract.

(Refused. Exception.)

5. There being no evidence in the case of any employment of the plaintiff by the defendant, the plaintiff can not recover.

(Refused. Exception.)

6. That the plaintiff's employment, whatever it was, was confined to the period between January, 1890, and October 1, 1890, in exploiting the patents then existing in the Departments of the United States, or some of them. That he can not recover a commission for or upon moneys paid by the United States under the contract with the United States made in 1893, which was based entirely upon a patent not in existence in the year 1890.

(Refused. Exception.)

7. That the question of the plaintiff's employment is to be decided by the laws of New Jersey, where the defendant was incorporated, and under which laws its president, as such, has no power to employ agents to represent the corporation.

(Charged.)

Mr. WALLIS. I except to so much of the court's charge as charges in effect that it was not necessary that there should be a resolution of the board of directors of the defendant to prove the plaintiff's employment by the company.

Also to so much of the charge as charges in effect that the general manager or president of the defendant may have obtained by a course of business authority to employ the plaintiff, or by a subsequent ratification upon the ground that no such authority or ratification has been shown.

Also to so much of the charge as charges in effect that what an officer of the corporation does by recognition or practice may bind the company, as there is no evidence in this case of any such recognition of the plaintiff's alleged employment or of any practice of the company in relation thereto.

Also to so much of the charge as charges in effect that if Harvey, in his alleged employment of the plaintiff, was acting within his powers it was the act of the company, upon the ground that it has no applicability in this case, there being no evidence as to what the powers of the president were.

Also to so much of the charge as leaves it to the jury to consider whether or no the employment extended beyond the time of September 30, 1890, upon the ground that by the pleadings in the case the plaintiff's alleged employment is confined to that date.

Also to so much of the charge as leaves it to the jury to determine whether the plaintiff was employed by the company in relation to armor plate, upon the ground that the pleadings of the plaintiff show to the contrary, and that under the pleadings the plaintiff's alleged employment was confined to the exploiting of patents in existence prior to September 30, 1890.

Also to so much of the charge as leaves it to the jury to determine whether the plaintiff's alleged employment included only tool and file steel, or whether it covered armor plate, upon the ground that the pleadings are to the contrary, and that under the pleadings and the facts as proven the employment of the plaintiff could not have applied to armor plate.

The COURT. I used the word "ratification" in my charge by way of illustration; not to charge that there is any evidence here by which any subsequent ratification can be found. I think there is none and charge you that there is none. If there was any employment you must find it in the contract itself and not by any subsequent ratification by the company.

Jury retire.

Verdict for plaintiff for $9,630.

Counsel for plaintiff moves for an extra allowance.

The COURT. Two hundred and fifty dollars.

Counsel for defendant moves to set aside the verdict as excessive, as contrary to law, and on all the grounds mentioned in section 999 of the Code of Civil Procedure, and for a new trial.

(Motion denied. Exception.)

Thirty days' stay after the service of notice of entry of judgment.

WASHINGTON, D. C., *February 8, 1896.*

The committee met at 10.30 o'clock a. m.

Present: Senators Cameron (chairman), Hale, Perkins, Chandler, Dubois, Smith, Bacon, and Tillman.

Hon. B. F. Tracy, ex-Secretary of the Navy, accompanied by Lieut. B. H. Buckingham, United States Navy, appeared before the Committee.

The CHAIRMAN. Gentlemen, we have, as it were, two subjects before us to-day. One is the resolution of Mr. Chandler, and Mr. Tracy is here on that branch in response to a request. We will consider that matter first. Then afterwards we will take up the bill introduced by Mr. Smith to provide for the erection of an armor-plate factory.

Senator HALE. In regard to the cost of the plants?

The CHAIRMAN. Yes; Mr. Tracy is here, and I suppose he is ready to answer any questions or to make any statement that may be desired of him. I, myself, have no questions to ask. Is there any other gentleman who wishes to interrogate Mr. Tracy?

Ex-Secretary TRACY. I have read the resolution under which you are acting, and I see that you are charged with the duty of ascertaining the reasons I had or which influenced me in certain action I took while Secretary of the Navy in the development of armor. It will give me great pleasure to make a statement to the committee.

Senator HALE. When you saw a notice of the resolution in the papers, General Tracy, you at once wrote to the committee, did you not, stating that you desired to be heard?

Ex-Secretary TRACY. I did.

The CHAIRMAN. I received your letter, and it has been presented to the committee.

Senator HALE. It was presented to the committee.

Ex-Secretary TRACY. And published in your proceedings.

Senator HALE. You have in your mind some form or method of statement that you propose to make, covering the subject?

Ex-Secretary TRACY. Yes, sir.

Senator HALE. I suggest, then, that General Tracy, having had a copy of the resolution that started the investigation, and having expressed a desire to appear before the committee, shall go on and make his statement in such form as he chooses. Then the committee afterwards may examine or question him as they may deem advisable. Will that be satisfactory to you, Mr. Chandler, who are the author of the resolution?

Senator CHANDLER. Perfectly.

STATEMENT OF HON. B. F. TRACY, EX-SECRETARY OF THE NAVY.

Ex-Secretary TRACY. Mr. Chairman and gentlemen of the committee, during the years 1890 to 1893 there was developed by the Navy Department of the United States an armor which is now known as the nickel-steel harveyed armor. Within a year after its final adoption here it superseded all other armor in the world. No naval power now uses any other armor than that which was developed by the Department during the years I have stated, except in England, where they use the Harvey process without the nickel. Other nations, as I am informed, adhere to the American formula of nickel-steel harveyed.

I will state briefly the history of that development; I think I may call it a discovery. Very early in my administration—I think as early as May, 1889—my attention was called to the subject of armor, a matter of which I then knew nothing. But I think as early as May, 1889, Mr. Bispham, of William H. Wallace & Co., of New York, said he wanted to have a conversation with me on the subject of armor. He thought Mr. Whitney had made a mistake in selecting all-steel armor instead of what is known as the English compound armor. He was the agent of the English compound armor men in this country, and he wanted to have a rehearing on this subject.

The subject was very new to me, and I listened with interest. I told Mr. Bispham I would give him a day for a hearing in the Department, and that I would have the naval experts, under whose advice I assumed Mr. Whitney had acted in adopting all-steel armor, present to hear what he had to say. He came, and they were present. He discussed the subject fully, and he left with me a large book published by the English armor manufacturers, giving reports of a great variety of competitive tests between different manufactures of compound armor, but mainly of tests between all-steel armor and compound armor.

Senator HALE. What is compound armor?

Ex-Secretary TRACY. It is an armor manufactured in England, and it was then well-nigh in universal use. My memory may not be accurate, but I think 95 per cent of all the armor on the men-of-war of all the different nations of the world was compound armor, which I will explain in a moment. France was manufacturing all-steel armor, and it also had establishments which were manufacturing the English compound armor. But the preference of France seemed to be strongly in favor of the steel armor. Outside of France little or none of it was

used. On studying carefully the reports of the tests that he brought to me, I was myself inclined to the opinion that the compound armor had the best of the tests.

Senator TILLMAN. Will you please state what is the difference between steel armor and compound armor?

Ex-Secretary TRACY. The difference between compound armor and steel armor is this: The all-steel plate is a homogeneous steel plate; the English compound armor is a steel hard-surface plate welded upon a softer back, the object being to present a hard surface, with the idea of breaking the projectile at the instant of contact before it enters the plate at all. That was the merit claimed for the compound plate over the all-steel plate.

Senator TILLMAN. Would not the soft back, too, have a tendency to keep the plate from cracking or from being so brittle?

Ex-Secretary TRACY. It was supposed so. That was the merit claimed for it. I was strongly inclined to the opinion that Mr. Whitney had made a mistake, on my view of those competitive tests.

I remember to have spoken to Mr. Folger on the subject of armor soon after the hearing in the Navy Department. He was then inspector of ordnance in the Washington yard. He told me that the compound armor was better in this respect, that it had a harder surface, and was better calculated to break up the projectile at the point of impact; but he said it also had a very great weakness, and that was at the point of welding; that the steel was likely to break and to cleave off at that point and expose the soft back. He said to me then that the ideal plate would be a homogeneous substance with a hard surface without the line of welding, if that could be avoided, but he suggested no way as to how such a plate could be produced.

Studying the competitive tests, I discovered, or at least I thought I discovered, that the tests were very ingeniously planned to give the plate the victory over the gun; that no matter whether it was a steel plate or a compound plate, neither of them was destroyed; the plates were damaged, leaving each party to claim that his, on the whole, was the least damaged. If the compound plate was more fractured, it was still claimed that, having the harder surface, it would shut out more projectiles than the steel plate; and that is the great object of armor plate, to exclude the projectiles. But I thought that those tests did not determine the ultimate capacity of the plates, and I made up my mind very early that we would have a competitive test in this country. Indeed, at this hearing, Mr. Bispham offered on behalf of the compound-armor men to furnish a plate free, if the all-steel men would do the same, for a competitive test in this country.

Some time after that I saw Commander Barber, who represented in this country the Schneiders, whose armor works are at Creusot, in France. He was then a naval officer, and had long been on leave, representing the Schneiders, and in their employ. I saw him, and we had a conversation on the subject. I told him what the compound-armor men had suggested, and asked him to communicate with his people in France.

Soon after this and as early as July of that year there came into the Department a man who was an entire stranger to me. He said he had called to see me on business; that he was the largest owner, and I think he said president, of the largest nickel mine in the world. I think he said that it was larger than any of the mines in New Caledonia. His mine was in Canada. He wanted to talk with me about nickel in connection with ordnance. He told me that he knew that an alloy of nickel and steel made a much stronger metal than simple steel. He

told me further that there was a call for his nickel matte in Europe which he did not exactly understand, and that he was going over to find out what use they were making of nickel in Europe. He lived in Akron, Ohio, and his name is Ritchie.

He said he was going to Europe very soon. He went home, and within a very few days he sent me a copy of an address that Professor Riley had delivered in Scotland in May, 1889.

The address was delivered, I think, in May, 1889, and Mr. Ritchie had received it and forwarded it to me in Washington. I read it. It was a discussion of experiments that he had made in the alloy of nickel and steel made in a very small way, but giving remarkable results of greatly increased tensile strength. I was very much interested in it and very much struck by it, because it occurred to me that that was exactly what we needed, a tough plate, one that would not crack and would not break.

I either wrote to Mr. Ritchie or telegraphed him, I do not know which, to come by the way of Washington on his way to Europe, as I wanted to see him. He came, calling at the Department.

He renewed his statement that he was going to Europe to find out what use was being made of nickel there. He did not know, but he suspected that it was being used for naval purposes. I said to him, "Would you not like some assistance in your investigation?" I said, "I think I have the means of aiding you very much in making your investigations." He said, "How?" I said, "I have a naval attaché, Lieutenant Buckingham, in London, who can have the entrée everywhere, and who has been there a long time and is well acquainted. I think he can be of assistance to you in ascertaining what you want to know."

Mr. Ritchie assented to the suggestion at once and was very glad to have this aid. On the 5th of August I issued an order to Lieutenant Buckingham to accompany Mr. Ritchie through Europe in his investigation to ascertain what uses were being made of nickel. He did so, and made two reports, which are now on file in the Navy Department.

In the meantime I had continued my conversation with Commander Barber, and I told him I wanted a competitive test; that I had been studying the reports of the competitive tests which had been published and that I was in doubt about it. I wanted one here, where we could see and know exactly which was the better plate. I wanted him to get his people at Creusot, France, to meet the compound-armor men and furnish a plate for the competitive test. He wrote to them, and they declined. They said their plate had been tested sufficiently, and they did not care to go into any more competitive tests.

After long urging and many interviews, I finally said to Commander Barber: "Commander, you undoubtedly understand that I know the relations that exist between Creusot and Bethlehem. I know that your people are interested in the Bethlehem contract for armor. Now, I want to say to you, and I want you to say to your people, that there never will be a contract for a ton of armor let by me until I have had a competitive test. They can cooperate voluntarily with it or not. I should like to have them do so if they will, but the test will be made, and they may as well understand it."

He sent that statement to the Schneiders, and he finally came back to me and said: "My people inform me that they have been experimenting with nickel with very favorable results." I asked him to what extent they had experimented with nickel. It was a great surprise to me to find that they had done so. He said they had made a 6-inch plate, I think it was; either a 4 or 6 inch plate, but I think a 6-inch plate. He said that they had tested it and were very favorably im-

pressed with it, and that if they were going to furnish a plate to compete with compound armor they would prefer to furnish a nickel plate rather than an all-steel plate, but that they would not furnish it free of cost.

Senator TILLMAN. Were the people you speak of the Schneiders?

Ex-Secretary TRACY. The Schneiders. When I say Creusot or Schneider, I mean the same firm. The Schneiders are at Creusot, France; their establishment is located there.

Senator CHANDLER. Creusot is the place.

Ex-Secretary TRACY. After reflection and consideration, I determined to order a nickel-steel plate of the Schneiders, and I did so. I think I gave the order in November, 1889. They accepted the order, and after waiting a long time I was informed that they had spoiled the first plate and had to make a second one.

Time ran on until spring and summer, but finally the plate was furnished. The compound-armor men, finding that Creusot would not furnish their plate free, refused to furnish a compound plate free. So the result was that the Department bought the compound plate and the nickel-steel plate. We were going to have the test between the two plates—the nickel-steel and the compound—but it turned out that the Department had an all-steel plate which had been procured from the Schneiders for another purpose. So, on consultation with Commodore Folger, we agreed to put all three in the test, to test the three plates. That test was had on the 18th and 22d of September, 1890.

Senator HALE. Where was it had?

Ex-Secretary TRACY. At Annapolis. Four shots were fired from a 6-inch gun, in the first instance, with the result that the compound plate of England was badly shattered.

Senator TILLMAN. At what distance?

Ex-Secretary TRACY. Thirty feet, I think, from the muzzle of the gun; a very short distance anyway. I may not be accurate as to the precise distance.

The CHAIRMAN. At pretty close quarters?

Ex-Secretary TRACY. It was very close quarters.

Senator HALE. It was meant to be a destructive test?

Ex-Secretary TRACY. It was so intended. Here [exhibiting] is a photograph showing the effect of the first four shots. The plate that is badly shattered is the compound armor plate, the middle one is the nickel-steel plate, and the other one is the all-steel plate. The compound-armor men had taken great pains in sending over their plate. They not only sent their plate and had Mr. Bispham, their agent in this country, present, but they sent a special agent from England to superintend the trial.

Senator HALE. An expert?

Ex-Secretary TRACY. An expert. At the close of the four shots by the 6-inch gun the compound armor plate was badly shattered, while the all-steel and nickel-steel plates seemed to be about on an equality. There was no perceptible difference between them.

It was determined to try an 8-inch gun on the plates. Commander Barber urged very strongly that that should not be done. He said that neither of those plates could stand the 8-inch gun; that it would simply destroy both plates, and would only serve to convince the people that armor plate was not a protection; that guns could beat any armor plate. He therefore urged me not to do it.

I told him that they had compelled the Department to pay for those three plates, and that the object of the test was to ascertain which was the best plate.

Senator BACON. This [indicating on photograph] is the opposite side from that from which the shot was fired?

Ex-Secretary TRACY. No; that is the front of the plate.

Senator TILLMAN. The Schneider plate shows that the ball did not penetrate; it broke off.

Ex-Secretary TRACY. It broke off.

Senator TILLMAN. The plate shattered the ball instead of the ball penetrating or perforating the plate.

Ex-Secretary TRACY. It was insisted that the 8-inch gun should be tried. The 8-inch gun was fired at the center of each of those plates. I expected to have photographs of the plates, but the Department does not seem to have a photograph of the last shot here.

Senator TILLMAN. I am entirely ignorant on this matter, because I have not read anything on the subject. What is the difference between the initial velocity and the velocity of a ball and the penetration, say, at a mile off? I do not mean exactly, but is it greater or less?

Ex-Secretary TRACY. The velocity is less a mile away; but I do not know exactly.

Senator TILLMAN. I am merely trying to find out for my own information.

Ex-Secretary TRACY. The detail of the test gives the initial velocity. I think it was 1,900-odd feet to the second.

Senator HALE. I think that is about it.

Ex-Secretary TRACY. All the experimental tests vary from 1,400 feet to 2,100 and odd feet. I think those tests were about 1,900 feet to the second.

When we brought up the 8-inch gun and fired it, it broke the compound armor plate all to pieces; it absolutely destroyed it. It cracked the all-steel plate into four pieces, a wide crack going right down from corner to corner. The nickel-steel plate for all purposes of a plate on a ship was just as good after the 8-inch gun had been fired as it was before any gun had been fired at it at all. The projectile either had not perforated the plate and had been thrown out, or it had stuck tight to the plate, plugging the hole.

Senator HALE. Do you remember the thickness of the plate?

Ex-Secretary TRACY. Ten and a half inches. There was no crack in the nickel-steel plate in anyway. It was absolutely as perfect for all practical purposes of an armor plate after the five shots had been fired into it as it was before. That experiment created a great sensation everywhere in the naval world.

Congress, seven days after that test, appropriated $1,000,000 for the purpose of purchasing nickel, to be expended in the discretion of the Secretary of the Navy.

Senator HALE. Congress passed the appropriation unanimously, did it not?

Ex-Secretary TRACY. Yes; a vote of confidence of which I was very proud.

A contract for a small quantity of nickel was made at first, the intention being not to rest on a single experiment, but to test it thoroughly. While this was going on, sometime in 1890, the date of which I can not fix, although I can fix it as saying it was before a certain date, Folger, then inspector of ordnance, in charge of the navy-yard, came to me one day and said, "I am buying tool steel of a man who has a method of hardening the surface of the steel so that it will hold an edge most remarkably. I have been studying and thinking and looking into it, and I have asked him if he thinks he can apply the process to a

larger mass of steel, and he says he could. I asked him if he would, and he said he would, and he is about to do it." Afterwards that was done.

Senator CHANDLER. Where was it done, Mr. Tracy?

Ex-Secretary TRACY. It was done in Newark. At least it was so reported to me. I have no personal knowledge of any of these matters.

Senator SMITH. Their plant is located at Newark.

Ex-Secretary TRACY. Their plant is located at Newark, and I suppose it was done at Newark. It was a thick square block, and the report to me was that the surface was so hard that no drill could penetrate it. The question came up of trying the experiment on plates, and we agreed that it was wise to undertake it, to follow the experiment in a small way, and to see what the effect would be on plates. Accordingly, there was ordered from the Linden Steel Company a 6-inch plate, and it was sent to Newark to be harveyized. One-half of it was to be harveyized, and the other half was to be left untouched.

Senator HALE. This is the first time you have used the description or the name "Harveyized." That is the process that has been referred to?

Ex-Secretary TRACY. That is the process I refer to. I thank you for the explanation.

Senator CHANDLER. Explain who the company was of whom you bought the plate.

Ex-Secretary TRACY. It was known as the Linden Steel Company. I do not know who are the members of the firm. I will state that I have seen their names recited in the contract with the Navy Department.

Senator CHANDLER. Located where?

Ex-Secretary TRACY. Located in Pittsburg, I think. I remember asking Mr. Folger also at one of the early interviews on this subject whether the process was covered by a patent. He said it was; that the patentee was a Mr. Harvey, and that the man with whom he was dealing was Mr. Harvey.

This plate was taken to Newark and harveyized there and then brought over here for some treatment, I have forgotten what. They were afterwards tried at Annapolis.

Senator HALE. The two plates?

Ex-Secretary TRACY. The two plates; both of them, the one that was harveyized and the other that was not.

Senator HALE. Were they both nickelized plates?

Ex-Secretary TRACY. No; all steel.

Senator HALE. All steel?

Ex-Secretary TRACY. All steel. This was going on before we got very far in the nickel experiments. It was early in 1890.

The plates were tested at Annapolis, and the plate that was harveyized showed remarkable qualities of resistance. The plate was ordered from the Linden Company in the autumn of 1889, delivered in February 1890, and tested at Annapolis June 27, 1890. It was so successful that the question arose at once as to further experimenting.

Senator BACON. Have you stated the size of those two plates?

Ex-Secretary TRACY. No; I have not stated the size of them. They were small 6-inch plates, each 24 by 30 inches. It was a long piece originally, a long slab, and it was cut in two, and one-half of it harveyized and the other was not. They were tested to ascertain the additional resistance given by subjecting the plates to the Harvey process.

Senator BACON. Tested by gunshots?

Ex-Secretary TRACY. By shot. Six-pounders were fired against them.

Senator HALE. Six pounders or 6-inch guns?

Ex-Secretary TRACY. Six-pounders against the thin plates. It was the first test of the harveyized plate that was ever made. The question then came up about further experiments, and about building a furnace at the yard to harveyize a large plate. After discussion it was deemed proper and wise to insist upon the right of the Government to use this process in case it proved successful. We insisted upon that as a preliminary, and we made a contract to that effect in 1891, which is recited in full in the Harvey contract of 1892. You will observe in reading that the first contract was made in 1891, not 1892, by which the Government secured the right to use the process, if it proved successful, for a half cent a pound, not to amount to more than $75,000, however. When the royalty amounted to $75,000 the half cent a pound was to cease.

That was for all the ships that were authorized at that time upon which we chose to use it. They agreed in case further ships were authorized to make a further contract, and they agreed not only to give us the benefit of the patent process they then had, but of any improvement that might be discovered in applying the process to the armor.

A furnace was built here in Washington and a 10½-inch plate was harveyized with excellent success so far as resisting power was concerned, but it warped in chilling. This plate was tested in February, 1891, and all the projectiles were broken up. It demonstrated the power of resistance given by the Harvey process. The first contract was made in March following—March 3, 1891.

Before this time the trial of the three plates at Annapolis had taken place, and when we discovered the toughness of the nickel plate, that you could not crack it, we said: "Now, if the Harvey process can be applied to nickel steel, we have the ideal armor."

Senator HALE. You would have them both?

Ex-Secretary TRACY. We would have them both. We had got the hard-surfaced plate upon a homogeneous mass of steel, and the problem from thenceforward was to unite those two processes and combine them in a single plate.

That went on from 1890 to 1891, step by step until it was finally consummated, and after the experiments had ceased and we had demonstrated the invulnerability, or the comparative invulnerability, of that plate, we decided to adopt it in the Department, and to have all the armor made of nickel steel, harveyized.

The CHAIRMAN. This was all prior to the appropriation by Congress for the purchase of nickel?

Ex-Secretary TRACY. Oh, no.

Senator CHANDLER. It was afterwards?

The CHAIRMAN. Afterwards?

Ex-Secretary TRACY. This was after the appropriation had been made.

The CHAIRMAN. You had taken care to get the nickel before making the tests?

Ex-Secretary TRACY. Yes.

Senator HALE. You had secured the nickel?

The CHAIRMAN. You had secured the nickel?

Ex-Secretary TRACY. I had secured the nickel.

Senator HALE. Under the appropriation?

Ex-Secretary TRACY. Under the appropriation. After several tests, the crowning test, which demonstrated absolutely and beyond all question the superiority of this armor over any other that had ever before been devised, was made at Bethlehem July 30, 1892, on a plate manufactured by the Bethlehem Company.

When I took office in 1889 the only provision for the manufacture of armor was that made by my predecessor with the Bethlehem Company, in which the Bethlehem people had undertaken to found a plant and to manufacture 6,700 tons of armor for the United States at the price agreed upon. They were to complete the plant in two years and a half from the date of the contract, which was in June, 1887, and within two months after the completion of the plant they were to deliver 300 tons of armor and thereafter 300 tons per month until the whole 6,700 tons were completed.

Senator HALE. That was under the contract which was made by your predecessor?

Ex-Secretary TRACY. Under the contract made by my predecessor. Their first delivery——

Senator TILLMAN. How long was that before you came into office, General?

Ex-Secretary TRACY. I came into office in March, 1889, and the contract with Mr. Whitney was made in June, 1887.

Senator TILLMAN. So it was shortly after your induction into office that the deliveries were to begin?

Ex-Secretary TRACY. Their first delivery should have commenced on the 1st of February, 1890. Before I had been a year in office, in December, 1889, at the time when their plant should have been completed, I of course was aware that it was not completed.

I had visited Bethlehem in the fall of 1889, and I knew their plant was not completed.

Senator CHANDLER. Wait a moment, Mr. Tracy. I should like to have a fact appear at this time, in justice to the Bethlehem Company, which I notice does not appear anywhere in Secretary Herbert's statement. That is, that there was a contemporaneous contract made by Mr. Whitney for the production of gun metal, and the deliveries of gun metal were made, were they not, Mr. Tracy, strictly in accordance with the contract?

Ex-Secretary TRACY. Yes, substantially.

Senator CHANDLER. Substantially.

Ex-Secretary TRACY. They were made substantially in accordance with the contract.

Senator CHANDLER. All this time the Bethlehem Company had been making metal for guns and delivering it?

Ex-Secretary TRACY. Yes.

Senator HALE. Aside from the armor plates?

Senator CHANDLER. It was an entirely separate contract. It did not appear the other day that the Bethlehem Company had this contract.

Ex-Secretary TRACY. There was such a separate contract, and they fulfilled it. But in respect to the armor contract, they did not comply with the contract as to the time for the completion of the plant. Now, in December, 1889, I wrote or telegraphed to the Bethlehem Company to state to me the time when they would be able to begin the delivery of armor, and the quantity of armor they could deliver in 1890 and in 1891.

I think it was in response to that telegram or letter that Mr. Wharton and Mr. Jacques came to the Department, and I questioned them as to when they could begin the delivery of armor; how much they could deliver in the year 1890, and what quantity they could deliver in 1891. They told me that they would begin the delivery of armor within six months from that time.

The CHAIRMAN. In June, 1890?

Ex-Secretary TRACY. That would be in June or July, 1890; that they would deliver from 1,500 to 2,000 tons a year, and they would complete their contract in the year 1891. They said they would deliver from 8,000 to 10,000 tons, if necessary, in the year 1891.

Senator HALE. Their contract called for the commencement of the delivery on what day?

Ex-Secretary TRACY. On the 1st of February, 1890.

Senator HALE. And so much per month thereafter?

Ex-Secretary TRACY. Three hundred tons per month from that on.

Senator HALE. They had found that they could not, in the condition of the plant, begin delivering armor in February, but believed they could do so in June?

Ex-Secretary TRACY. Yes.

The CHAIRMAN. Or July.

Senator HALE. Or July?

Ex-Secretary TRACY. Yes. I said to those gentlemen: "I should like to have you go home and put your statement in writing."

Senator TILLMAN. Was there any forfeiture in the contract made by Secretary Whitney for failure to comply with it?

Ex-Secretary TRACY. No; there was no forfeiture. Those gentlemen went home, and they did put their oral statements to me in writing, repeating what they had stated orally at the Department.

Senator TILLMAN. General, will you give any information of which you were possessed or which you obtained when you came into the office as to whether the original contract contemplated giving a much higher price for armor by reason of the unusual and extraordinary expense these people would have to incur to get the necessary appliances and the plant?

Ex-Secretary TRACY. I always assumed that to be true.

Senator TILLMAN. Is there nothing existing in the archives of the Navy Department which would show that?

Ex-Secretary TRACY. Not that I am aware of; but I always had assumed that when the United States asked a firm to found a plant, without any guarantee of a specific amount of business to justify it, they would have to pay necessarily a larger price for that quantity than they would have to pay if they were giving a guarantee of continuous business from that time on.

Senator TILLMAN. Is there nothing in existence going to show what was claimed to be the necessary extraordinary expenditures to enable the manufacturers to make the armor?

Ex-Secretary TRACY. I do not think there is anything on file in that respect. I have an idea as to what the Bethlehem Company claim they expended.

Senator TILLMAN. Will you please state what it is?

Ex-Secretary TRACY. In founding the plant, from $3,000,000 to $5,000,000.

Senator CHANDLER. Were not there some previous reports to the Department as to the probable expense of a factory for armor plate?

Ex-Secretary TRACY. There may have been. Do you mean for the Government to build such a factory?

Senator CHANDLER. Yes.

Ex-Secretary TRACY. There may have been. If there is such a report on file in the Department, I did not know it.

Senator HALE. If there was such a report, it was before your day?

Ex-Secretary TRACY. Yes, sir; it was before my day. There was no such thing in my time.

I waited until May, 1890, when, finding that no armor had been delivered, and getting no prospect of any delivery, I ordered Commodore Sicard to proceed to Bethlehem and to inspect the works there and make a report as to when in his judgment the plant would be completed and they would be ready to begin to furnish armor.

Senator CHANDLER. Have you previously inserted your reply to their letter?

Ex-Secretary TRACY. No; their letter of assurance I do not think I replied to. My reply that I referred to comes in later.

Senator HALE. What about their letter of assurance which they submitted to you after they had the oral interview?

Ex-Secretary TRACY. They repeated in writing that they would deliver from 1,500 to 2,000 tons of armor in 1890, and a quantity of armor in 1891, which would more than complete their contract.

(See extract in letter of Secretary Tracy to the Bethlehem Iron Company of July 15, 1890, p. 132.)

Senator HALE. That is the letter of the Bethlehem Company submitted to the Secretary of the Navy after the oral interview in December, 1889, stating the time at which they then believed they could deliver the armor?

Ex-Secretary TRACY. At which they would deliver it. It was in positive terms.

Senator BACON. And which was in itself an extension of time?

The CHAIRMAN. Yes.

Senator HALE. Commodore Sicard visited Bethlehem?

Ex-Secretary TRACY. He visited the place and made a thorough inspection and examination, and his report was to the effect that in his judgment they would not be able to deliver the armor yet for eighteen months from 1890; and he gives in great details the reasons why. On the receipt of that report——

Senator HALE. When?

Ex-Secretary TRACY. In May, 1890; the last of May.

Senator BACON. About a month before the time they said they would begin?

Ex-Secretary TRACY. A little over a month. I have the date here. January 25, 1890, is the date of the Bethlehem Company's letter stating that they would begin the manufacture of armor in six months and manufacture from 1,500 to 2,000 tons that year. This is all set out in my report of 1890 fully and in great detail.

Senator HALE. In your report as Secretary of the Navy?

Ex-Secretary TRACY. As Secretary of the Navy, pages 17 and 18.

Senator CHANDLER. Which Mr. Secretary Herbert has put in?

Ex-Secretary TRACY. I think Mr. Herbert put in that extract.

Senator CHANDLER. It is in the record now.

Senator HALE. That was Commander Sicard's report, then, in May?

Ex-Secretary TRACY. Yes. May 14, 1890, Sicard reported upon his

first visit to Bethlehem. I waited; nothing came. Then I wrote them the following letter:

"JULY 15, 1890.

"The BETHLEHEM IRON COMPANY,
"*South Bethlehem, Pa.*

"GENTLEMEN: On the 16th of December last I telegraphed you making inquiry as to when you would be able to commence the delivery of thick armor plates under your contract with the Government of July, 1887, and what quantity of armor you could deliver to the Government during the year 1891. Replying to this telegram under date of December 23, 1889, you say: 'We beg to inform you that we expect to be able to deliver from 8,000 to 10,000 tons of armor during the year 1891.'

"On the 22d of January, 1890, I had an interview with your Mr. Wharton and Mr. Jacques at the Navy Department on the same subject, and requested them to put the assurances of your company to deliver the armor in writing. On January 26 I received the following letter from your company dated January 25, 1890:

"SIR: In accordance with your request, we have the pleasure to confirm the oral statement made to you at the Navy Department on the 22d instant by our Mr. Wharton and Mr. Jacques that within six months we shall commence the manufacture of the thick armor plates under our contract of June 1, 1887; that we will be able to deliver from 1,500 to 2,000 tons this year; from 8,000 to 10,000 tons in 1891, and that our annual capacity thereafter will be not less than 10,000 tons.

"Receiving on the 1st of May last information which led me to doubt whether your company would be able to comply with the assurances cantained in your telegram and letter as above quoted, on the 2d of that month I directed Captain Sicard to visit your works for the purpose of ascertaining, by personal inspection and interview with your manager, the degree of progress which you had made toward the completion of your plant for producing thick armor, and to ascertain as near as practicable the time when you would be able to commence the deliveries of such armor to the Government. In his report, under date of May 14, 1890, Captain Sicard says:

* * * "This examination leads to the conclusion that the plant for the manufacture of thick armor is about one-half completed, and that, if the company conducts its work in the same general manner as heretofore, the plant will be ready to produce thick armor in about fifteen months from the present time.

"He adds, however, that he is of opinion that if the work is pressed with vigor and the different branches are carried on simultaneously the plant might be completed in about one year, that is, by the 1st of May, 1891. He admits, however, that your general manager, Fritz, claimed that he would be ready to commence the manufacture of armor about October 1, 1890.

"In June last I saw and had a long interview with your Mr. Jacques and called his attention to the contents of Captain Sicard's report. He repeated the assurances given by Mr. Wharton and himself in the Department, in January last, and insisted that Captain Sicard was entirely mistaken in his estimate of time as to when you would be ready to commence the delivery of armor.

"The *Maine* will be launched at New York in September, and her thick side armor will be needed immediately thereafter. Any considerable postponement of the deliveries of armor after October 1 will seriously delay the completion of this ship. We shall need armor also by that time for the *Terror* and the *Puritan*.

"On the 25th of this month the time will have expired when Mr. Jacques and Mr. Wharton assured me at the Department that your

company would be ready to commence the delivery of armor plates. The lapse of time has clearly demonstrated the inaccuracy of the estimate of time by your Mr. Wharton and Mr. Jacques, and I greatly fear that it has also demonstrated the inaccuracy of the prediction made by your Mr. Fritz in his interview with Captain Sicard in May last.

"The demands of the Department for thick armor are so pressing that it is necessary to know definitely whether you will be able to deliver any of such armor to the Government this year; and if so, in what quantities and at what times.

"By the terms of your contract with the Government you were to commence the delivery of thick armor plates in February, 1890, and you were to deliver each month thereafter not less than 300 tons per month. There is now due to the Government upon your contract 1,800 tons of thick armor. The deliveries of this armor can not be delayed after the 1st of October without seriously embarrassing the operations of the Government. The Department fully realizes the magnitude of the work which your company undertook in the founding of this plant, and is willing to grant every reasonable consideration arising from unforeseen contingencies, but no such contingency has as yet arisen, at least the attention of the Department has not been called to any such contingency by your company. The report of Captain Sicard leads me to infer that, in his opinion, the work has not been prosecuted on your part with that vigilance which the importance of the undertaking required.

"The hammer necessary for the manufacture of this armor, which was well under way when I visited your place in the fall of 1889, is not yet completed, and recent information leads me to believe that it will not be completed for six months. It is difficult to exaggerate the gravity of the situation under which the Government will be placed if there is to be any further delay after October 1 in the delivery of thick armor. I have, therefore, to request that you will in reply to this state definitely the time when such delivery will begin.

"Very respectfully,

"B. F. TRACY,
"*Secretary of the Navy.*"

Under the date of July 24, 1890, they replied as follows:

"THE BETHLEHEM IRON COMPANY,
"*South Bethlehem, Pa., July 24, 1890.*

"Hon. BENJAMIN F. TRACY,
"*Secretary of the Navy,*
"*Navy Department, Washington, D. C.*

"SIR: Replying to your communication of the 15th instant, relating to the delivery of armor plate under our contract with the Government of June 1, 1887—

"While the estimate as stated in our letter of January 25, 1890, as to the time of beginning manufacture, was at fault, we are still expecting to commence within the next two months the manufacture of certain armor for which we have received drawings and which we understand is now urgently needed, namely: The bulkhead plates of the *Maine*, the conning tower of the *Terror*, and the conning tower communications of the *Texas*. As to the amount of plates that we hoped to deliver:

"At the time of your interview with our Messrs. Wharton and Jacques, we expected to be able to produce a considerable amount of thick plates

with our present appliances, and added to this, if the protective deck plating covered by Exhibit U of our specifications were now needed by the Department, we could arrange to have a considerable portion of it rolled elsewhere and brought to our works for shaping, tempering, and fitting, and thus also in good part, fulfill our statement as to the amount we could deliver during the present year.

"We are fully aware, however, that the deliveries above referred to are of the nature of temporary expedients, and that the end so earnestly desired by all parties concerned, and of paramount importance, viz, the completion of our hammer plant and the regular deliveries of the hammered and tempered plates for side armor, has been and will be delayed beyond our expectations.

"As is always the case in undertakings of such magnitude, the causes of delay have been numerous, and while no 'unforeseen contingencies' have arisen of such a pronounced nature as to lead us at the time to formally draw the attention of the Department thereto, there have been several causes of serious delay which were beyond our control.

"The establishment of our general forging plant, together with its accompanying machine shop and heavy tools, was of course, of first importance; not only did the Department desire that the delivery of heavy gun forgings should begin at as early a date as possible (to say nothing of the shafting required by the larger cruisers then in the course of construction, and which could not be produced elsewhere in this country), but the tools and appliances forming part of this plant were necessary for the construction of a hammer, composed, as it would be, of parts of exceptional dimensions and weight, and some of these tools and appliances could only be made at our shops.

"It is proper to state that before any contract was entered into with the Department that this company had the buildings for the gun-forging plant well under way, and contracts made for tools and machinery for the same, aggregating in value about $600,000."

[From that it appears that they had made their contract for gun forgings sometime before they made that for armor plates and had expended $600,000 already before the making of the armor-plate contract with the Department.]

"The Department is aware that the forging presses and some of the large tools comprised in this plant were ordered from Sir Joseph Whitworth & Co., in England, to whom we had gone, at very large expense, in order to obtain what we believed, and what were generally admitted to be, the best appliances in existence for making heavy steel forgings, and of whose large experience we were thus able to avail ourselves.

"The final delivery of these machines was delayed some eighteen months beyond the date agreed upon, and thus held back the completion of that portion of our work. This delay had a marked effect in postponing the beginning of the construction of the hammer. The opinion was then rapidly gaining ground that the hydraulic press was superior to the hammer as a forging machine, and we had hoped to obtain our largest press in time to make experiments with a view of ascertaining whether a press of sufficient power could be, with advantage, substituted for a hammer for the manufacture of armor plates.

"The long delay in receiving the forging press from the English makers not only prevented such experiments being made in time, but postponed the taking of active steps in the construction of the hammer.

"The construction of our fluid compression plant, a most important introduction into this country, and as essential to the best work and

wants of the Government as any part of our plant, proved, from the difficulties that were met in putting in the foundations, a much more serious undertaking than was anticipated, and required, during a long period, almost the undivided attention of our engineering force.

"As originally planned, the hammer was to be placed near the fluid-compression pit, but the excavations for the latter showed that the underlying rock strata was entirely unfit to support the foundation of a great hammer, and pits had to be sunk at points more or less removed to obtain information upon this all-important point. In these excavations large amounts of water were encountered, which proved beyond our power to control. A complete change in our plans as to the location of the hammer was therefore necessary, and it was only after the examination of three different sites, requiring tedious prospecting and the outlay of much labor and money, that suitable ground was found. Since that time the actual work of construction has certainly been pushed with unremitting energy and vigilance, and, although we have been much delayed in the outdoor work, and especially in putting in the foundations, by an unusual amount of rain and consequent high water in the river, the work has undoubtedly made rapid progress.

"Besides the very extensive work accomplished in the construction of foundations and buildings, including excavations, pile driving, the putting in of large masses of masonry, and the erection of a building of exceptional height and strength, we have made within the last fifteen months some 25 or 30 castings, weighing from 70 to 110 tons each, most of which were of such dimension as to require for their machining those exceptionally large tools which, in order to expedite the work, we ourselves constructed, and which exceed in capacity any existing in the world.

"We have also made a large number of forgings for use in the construction of the plant, and tools therefor, and our books show that the weight of these forgings had been, up to June 1 of this year, equal to 25 per cent of the total product of our forge.

"In consideration of the foregoing, we do not think that the inference of the Department, from information it has received, that 'the work has not been prosecuted on our part with the vigilance that the importance of the work required' is a just one.

"There was a misunderstanding, we think, on the part of Captain Sicard as to the time fixed by our Mr. Fritz of commencing the manufacture of armor. Mr. Fritz stated that he expected to have the hammer erected, though not complete, by October 1 of this year, and fully expected to have it running by January 1, 1891, and he sees no reason to change his views at this time. The accessories to the hammer, including preparations for casting ingots, the construction of a 6,000-ton bending press and of the tempering plant, together with their necessary furnaces, cranes, etc., represent an amount of work totally unappreciated by any but those engaged upon it. This is now all well in hand, and will make rapid progress.

"Two representatives of the company have recently spent several weeks at the works of the Creusot Company in France, studying the practical details of the manufacture of armor plates, so that we are well informed in this regard, and ready to begin the manufacture with considerable certainty of success. Indeed, no effort is being spared by this company, either in unremitting work day and night or the expenditure of money, to push to completion what it has undertaken, and although deliveries will be delayed far beyond the time contemplated in the contract, it should be considered that a plant is being established

comprising more powerful appliances than any now in existence, which, when completed, will insure to the Government a supply of material of equal quality and magnitude to any that can be produced in the world.

"It may be said further, with entire frankness, that we have been much mortified at the error in estimates of time, and the unavoidable delays that have occurred in the armor-plate branch of our contract, but both branches of the work have been and are inseparably connected, and no better argument can be adduced of the earnest and energetic manner in which the whole has been pressed, than that we have been in advance of the contract time for the delivery of gun forgings, and that we have expended on the plant for Government work, in buildings, machinery, and tools and appliances, between $2,500,000 and $3,000,000, and, it might be added, it will require at least another million to complete the work.

"In conclusion, we may say, after a careful consideration of the condition of the work as it now stands, that we think that Captain Sicard's estimate of fifteen months from May, 1890, as the time at which the actual manufacture of hammered plates will begin, is more than ample, and that we have strong hopes of anticipating this date with actual deliveries, and when this manufacture is once begun we will have no difficulty in exceeding the rate of deliveries as fixed by our contract.

"The writer will endeavor to see you at an early day in relation to this matter, and would ask you to appoint a place and time to suit your convenience.

"Very respectfully,

"THE BETHLEHEM IRON COMPANY,
"ROBT. H. SAYRE,
"*General Manager.*"

Senator CHANDLER. There is no objection to Mr. Tracy putting into the record anything he likes, so far as I am concerned. I have not challenged the wisdom of making the second contract. The only point that I have raised was the reason why the 2 cents a pound was provided as a nickel-steel fund. However, I am conscious that the question of the wisdom of the whole contract has been raised, and I do not want to put any limit upon Mr. Tracy in the way of putting in anything he thinks will throw light upon the subject.

Senator HALE. I think we all understand that in tracing as briefly as you can this history of the carrying out of your policy, any letters or reports, or anything that you wish to put in to make the connection and demonstration, you can put in afterwards and not read now.

Ex-Secretary TRACY. All right.

Senator CHANDLER. Secretary Herbert has already put in extracts from Mr. Tracy's report.

Senator SMITH. The only question that came up on that subject was as to the authority of the Secretary to divide the contract, whether it only gave authority to make the contract with the Bethlehem Company.

Senator CHANDLER. Mr. Whitney's original authority Senator Smith has asked about once or twice—the original legal authority of Mr. Whitney to make a private contract, which, continuing, gave you authority to make a second contract with the Carnegie Company.

Ex-Secretary TRACY. I see that some Senators fell into a misapprehension in supposing that I had taken from the armor that was contracted to Bethlehem and given it to Carnegie. That is a very great *mistake; it is a misa*pprehension entirely.

Senator BACON. There was a question or two asked about that, but the answer to the replies fully showed that there was nothing of that kind.

Senator CHANDLER. That was done, as a matter of fact, was it not?

Ex-Secretary TRACY. No.

Senator PERKINS. The ex-Secretary denies it?

Ex-Secretary TRACY. It was not done, as a matter of fact.

Senator CHANDLER. You say that none of the armor that was included in the Bethlehem contract——

Ex-Secretary TRACY. Was given to Carnegie by contract?

Senator CHANDLER. Yes, sir.

Ex-Secretary TRACY. None.

Senator CHANDLER. Do you say that none of the drawings and specifications for making the armor for particular ships that had been furnished the Bethlehem Company were afterwards furnished to the Carnegie Company, and that they produced the armor?

Ex-Secretary TRACY. Only by mutual consent of the two companies and for the purpose of facilitating the delivery of the armor. I will come to that in a moment. The only armor that I ever took from Bethlehem was from 800 to 1,000 tons of deck plating that was in their contract in Schedule U, for which the Department had agreed to pay $490 a ton. They were not able to deliver that in time, and I knew it was a most excessive price for it, not that I criticised Mr. Whitney for making it, for I do not; it was all a lump sum. It was given to them to induce them to found this plant. But knowing that we were to have further armor made, it occurred to me that the Government could save the excessive price that was to be paid for the deck armor, and as they were not in a condition to furnish it, I suggested to them that I should be permitted to supply that elsewhere and make up the quantity to them in heavier armor later on.

Senator HALE. Afterwards?

Ex-Secretary TRACY. Afterwards. They assented to that. That was done, and that contract was let to the Linden Steel Company at a saving of nearly $400,000 to the Government in that one transaction.

Senator HALE. Do you remember, instead of the $490 a ton for that deck armor, what the contract with the Linden Company was per ton?

Ex-Secretary TRACY. It is per pound: 6.9, 3, 3¼, and 4 cents per pound.

Senator HALE. The contract with the Bethlehem Company had been at what per pound?

Ex-Secretary TRACY. Four hundred and ninety dollars per ton; and the contract was let to the Linden Company at from $75 to $80 and $140 a short ton.

Senator SMITH. Do I understand that the Linden Company's bid covered the same different grades of armor as the bid of the Bethlehem people?

Ex Secretary TRACY. I will explain that to you. Yes; in a sense it did, and in a sense it did not. The contract of the Bethlehem Company required the deck plating to be 3 inches thick. The experts in the Navy said for deck plating three thicknesses of 1-inch plate were substantially as good as a plate 3 inches in thickness. So, acting upon their advice, I made the substitution. I substituted three thicknesses of 1-inch plating, as I understand it and remember it, for a single plate 3 inches thick.

The CHAIRMAN. Was not the 1-inch plating of three thicknesses more expensive than the 3-inch plating?

Ex-Secretary TRACY. No; the three thicknesses would be less expensive per ton.

Senator HALE. That is, it would cost less to furnish three 1-inch plates?

Ex-Secretary TRACY. I think so, beyond question.

The CHAIRMAN. No, I think not.

Ex-Secretary TRACY. I want it distinctly understood that I am making no reflection at all upon that previous contract. I should undoubtedly have made it myself under the circumstances. But finding that item in the contract where I thought a saving could be made to the Government I negotiated with Bethlehem to have this deck plating made elsewhere.

Senator HALE. Can you not give us something of the difference between these two contracts per ton?

Ex-Secretary TRACY. Yes; I have it right here.

Senator HALE. State how much the difference was per ton and then we will ask you how much difference was made by taking the three 1-inch plates.

The CHAIRMAN. We can get at those figures hereafter just as well.

Senator HALE. But if General Tracy has it before him——

Ex-Secretary TRACY. I can give you the aggregate difference. Those plates were let to the Linden Company at from $73 per ton, the lowest price, to $147 per ton, the highest price, and the aggregate as figured and given me by the Department was that under the first contract the cost of that lot of plate would have been $534,145. The actual cost of it was $137,224, making, as you will see, a saving of $397,000 to the Government. Subsequently I did give to Bethlehem a corresponding amount of thicker armor at the contract price of that thicker armor.

Senator BACON. Are we to understand that that is the difference between the cost of the single 3-inch plates and the three 1-inch plates?

Ex-Secretary TRACY. I do not know the actual cost. That is what it would have cost the Government.

Senator BACON. That is what I am speaking of.

Ex-Secretary TRACY. Yes.

Senator BACON. The only difference between the two is that in one case there are three 1-inch plates, and in the other case there is a solid 3-inch plate, and there was a difference in cost of over $300,000.

Ex-Secretary TRACY. Of $397,000.

Senator PERKINS. How much a ton?

Ex-Secretary TRACY. One was $490 a ton, and the other was a price varying from $73 to $147 a ton.

Senator SMITH. How many different thicknesses of plate were included in the contract made by your predecessor with the Bethlehem people?

Ex-Secretary TRACY. All the way from 3-inch plate, and some even less than that, to 16 or 18 inches. Can you state, Lieutenant Buckingham?

Lieutenant BUCKINGHAM. I think it was 18 inches, the heaviest size.

Senator HALE. Deck plating is entirely distinct from side armor?

Ex-Secretary TRACY. It is entirely distinct. Do not make any confusion about that.

Senator SMITH. Was the price agreed upon by your predecessor based on a general average of all the different sizes of plate?

Ex-Secretary TRACY. No. There were different schedules made and different thicknesses. Different kinds of armor were scheduled under letter A, letter B, letter C, and letter D.

Senator SMITH. And each at different prices?

Ex-Secretary TRACY. Each at different prices. There was other armor also scheduled in Schedule U, and the whole of this schedule was $490 a ton. It may be and probably was true that the other armor scheduled was much more expensive than deck plate, and possibly much more expensive than $490 a ton.

Senator SMITH. That is the point I was trying to get at.

Ex-Secretary TRACY. That may be true. As I said before, I am making no criticism at all on that contract.

Senator SMITH. I understand.

Senator HALE. You have said that quite likely you would have made the same contract yourself?

Ex-Secretary TRACY. Yes; but what I say is that finding this quantity of deck plating in the contract at that enormous price I thought that if I could exchange high-priced armor with them and get it out and have it made cheaper I could make a large saving to the Government, which I did.

Senator CHANDLER. However, you agreed to make it up to them, but not in that kind of armor?

Ex-Secretary TRACY. Not in that kind of armor.

Senator HALE. You were in such a position then, the appropriations had been so started and the policy so fixed, that you knew you could count upon the future for other armor and a future supply?

Ex-Secretary TRACY. Yes; I assumed I could, and that turned out to be the case. But I did it to what I supposed was their satisfaction.

Senator BACON. If I understand you correctly, your point is that by getting a certain part of what was included in the former contract made at a cheaper rate you were enabled to put that difference upon a similar armor; that is, armor like that in the first contract of the higher class at a higher rate, so that the average would be about the same?

Ex-Secretary TRACY. No.

Senator BACON. Is that correct?

Ex-Secretary TRACY. No. Here was a special thing——

Senator BACON. You paid an increased price for the armor plate—2 cents a pound. Do I understand you to mean that that was compensated for by the decreased price on the deck plate?

Ex-Secretary TRACY. I mean to say, if I can make myself understood, that finding in one of the schedules of the Bethlehem contract nearly a thousand tons of plating for which the Government was to pay $490 a ton, and for which, on the advice of the experts of the Department, I could get what was equivalent to it and just as good for the Government for from $73 to $147 a ton, I got the permission of Bethlehem to take that out of their schedule and give it to another company, by which I made a saving to the Government of a trifle less than $400,000. Afterwards I gave the Bethlehem Company an equal quantity of armor at the schedule price of $525 a ton, I think; but that was a thick armor, and that was the price we paid for all such armor.

The CHAIRMAN. You would have had to pay that price anyway?

Ex-Secretary TRACY. We would have had to pay that price anyway, no matter who made it, whether Bethlehem made it or Carnegie made it. That kind of armor which they took in place of these plates was armor that the Government by all of its contracts had to pay $525 a ton for.

Senator HALE. But when you took away certain work from them you were able to give them the same amount of work in the other kind of armor?

Ex-Secretary TRACY. In the other kind of armor.

The CHAIRMAN. More expensive armor?

Ex-Secretary TRACY. More expensive armor.

Senator BACON. I understand then this reduced price on deck plate had nothing whatever to do with giving 2 cents a pound extra on the other armor?

Ex-Secretary TRACY. Oh, not on the other armor. I will come to that in a moment. The 2 cents a pound was a transaction with Carnegie.

Now I was speaking of this correspondence. I will resume my narration of the story. Finding in the fall of 1890 that no armor was being delivered, I again sent Commodore Sicard to Bethlehem. His report is as follows:

"NAVY DEPARTMENT,
"STEEL INSPECTION BOARD,
"*Washington, November 28, 1890.*

"Hon. B. F. TRACY,
"*Secretary of the Navy.*

"SIR: Agreeably to the Department's order of the 20th instant, I have visited the works of the Bethlehem Iron Company, at South Bethlehem, Pa., and, having observed the progress made in the construction of the company's plant for the manufacture of thick armor, I beg leave to report as follows:

"My last report upon the progress made in the construction of the armor plant above mentioned was dated May 1, 1891, and since that time good progress has been made in the work, the hammer and its appendages being much advanced, and a large part of the smaller work pushed toward completion.

"On the occasion of this last visit, for the purpose of estimating the progress made, I pursued the same course of observation and inquiry mentioned on pages 1, 2, and 3 of my report of May 1, last, as that plan seemed practical and simple. The information I have obtained leads me to the conclusion that the plant for the manufacture of thick armor is about three-quarters completed, and that it will be in working order about June 1, 1891.

"On my arrival at Bethlehem I saw Mr. John Fritz, one of the directors of the company, and general superintendent of the works. He was stated to be the only member of the company present, and after stating to him the object of my visit, I asked his opinion on several points which will be hereinafter referred to.

"Mr. Fritz expressed the opinion that the plant would be ready to produce thick armor about April 1, 1891, the date being governed by his estimate of the time of completion of the great hammer and its appendages. I think his date rather early, and prefer two months later, as before stated. Our estimates, however, agree much better than on the occasion of my former visit, when we differed seven months; my estimated time being the largest, as in this case.

"After due reflection, I think that we should allow about four months after the completion of the plant for the delivery of the first 300 tons of thick armor under the contract. The difficulties surrounding the commencement of production are very great, and many failures will probably occur in striking the proper methods of treatment necessary for insuring the proper qualities in the plates; therefore, I fix upon October 1, 1891, as the probable date of the delivery of the first 300 *tons of thick armor.*

"After the first delivery, I estimate that deliveries will continue during the remaining three months of the year at the rate of 300 tons per month, making the total estimated amount delivered in 1891 to be 1,200 tons.

"I consider that in 1892 about 500 tons per month could be delivered, amounting during the year to 6,000 tons. At this rate, however, and not allowing for any delays or rejections, the pending contract with the Bethlehem Iron Company would be filled about July 31, 1892.

"I understand from Mr. Fritz that when Mr. Bowvard (of Creusot) visited the Bethlehem Works he stated that the works at Creusot turn out about 4,500 tons of armor per year when working at the usual rate of speed, but that when working at full capacity about 5,000 tons could be produced. Mr. Fritz further stated that Mr. Bowvard was of opinion that the Bethlehem works would be able to produce with considerably greater facility than Creusot, on account of the greater convenience of the arrangement of the plant and its greater capacity, and on account of the facility with which the work of the hammer could be disposed of. Therefore, 6,000 tons for 1892 does not seem to be an unreasonable estimate. Indeed, Mr. Fritz stated that if the firm had six months' notice of the requirements of the Department for a large amount of armor, by erecting 'preheating' furnaces for the assistance of the regular heating furnaces (at the hammer), and by increasing the facilities of the plant by a few easily practicable extensions or additions, the annual output could, in his opinion, be increased to as high a figure as 10,000 tons per year.

"If the plant was suddenly pressed to its greatest capacity, the point at which the 'choke' would take place would probably be at the heating furnaces for the hammer, and to a less degree in the trimming and finishing shop—that is, the hammer could work faster than its appendages. Increasing the plate heating capacity, preferably by erecting 'preheating' furnaces, would enable the hammer to perform more work. The trimming shop could readily be made to dispose of all the work by increasing the number of machine tools there, a matter readily accomplished.

"The oil treatment plant at Bethlehem provides for artificial cooling of the oil after use, and its return to the tempering tank speedily and regularly. I believe that the tank at Creusot is not so well arranged in this respect, and thus the Bethlehem works have a certain advantage in this respect. Still, as Creusot seems to consider its own output to be about 4,500 or 5,000 tons per year, I am of opinion that 6,000 tons per year is all that it would be safe to reckon upon from Bethlehem, when in good running order; but on this point I can not of course speak positively at present.

"Besides the hammer and its appendages, the Bethlehem Iron Works is building a heavy rolling mill, or 'plate mill' as they call it, for the purpose of making thick armor by rolling. This mill is not in a very formal state, and as it is not necessary to the manufacture of armor, it is not allowed to interfere in any way with the work upon the rest of the plant. If, however, at any time the Department should wish the company to supply rolled armor the 'plate mill' can be hastened, and in that case Mr. Fritz estimates that it could be finished in about eight months if pushed forward at the same time as the hammer; but if not hurried until after the hammer is completed, it could be finished in about six months from that time.

"To sum up, I estimate as follows:

"The *plant in running* order, June 1, 1891; first 300 tons delivered,

October 1, 1891; total deliveries in 1891, 1,200 tons; total deliveries in 1892, 6,000 tons. Pending contract with the company could probably be filled by August 1, 1892.

"I am, very respectfully, your obedient servant,

"MONTGOMERY SICARD,
"*Captain, United States Navy.*"

Senator BACON. Will you pardon one question before you pass from the point we have been discussing?

Ex-Secretary TRACY. Certainly.

Senator BACON. Was the rate at which that 3-inch plate was put in the original contract made by Secretary Whitney a correct rate at that time?

Ex-Secretary TRACY. I do not know anything about that.

Senator BACON. I am speaking of the 3-inch plate for which you substituted the 1-inch plate of three thicknesses.

Ex-Secretary TRACY. I do not know anything on that point. I saw I could save the Government that much by substituting a different kind of plate.

Senator BACON. You are not prepared to state whether the price fixed in the original contract was the correct price for 3-inch plate or not?

Ex-Secretary TRACY. No, I am not prepared to say.

Senator SMITH. General Tracy only states in a general way that he would have made the same contract at that time.

Senator CHANDLER. As a whole.

Senator HALE (to ex-Secretary Tracy). The conditions were entirely different when you came in?

Ex-Secretary TRACY. Oh, yes; they were founding this plant; and I want to say here to this committee that in my judgment (and it is a judgment I expressed in my report and repeat here) the existence of these two plants in this country for the manufacture of armor is worth more to the country than all the armor the United States has paid for up to this time. Without them we could have done nothing.

The CHAIRMAN. If they had never received a ton?

Ex-Secretary TRACY. Yes, if they had never received a ton. Without them this country could do nothing, absolutely. We would have been as helpless in time of war as China, and we would have been very much in her position. Without the armor-plate establishments, and without the armor-piercing projectile establishments, and without the modern brown powder for heavy guns, a hundred ships would have done us no good; if we had had the most modern ships in the world we would have been absolutely helpless.

Senator HALE. Do you not suppose that it was that large consideration which entered into or governed the mind of Secretary Whitney in making the original contracts?

Ex-Secretary TRACY. I have no doubt of it. Of course it entered into the mind of Congress, too.

Senator CHANDLER. If anybody else had said all this in the presence of yourself and Mr. Whitney, you would both have immediatedly admitted the truth of it, would you not?

Ex-Secretary TRACY. I have no doubt of it. I think every man who properly realizes the importance that these establishments have been to the country, and the capacity that it gives our Government to build its own ships of the highest class, absolutely independent of other nations, can not fail to appreciate it.

Senator CHANDLER. You do not make these remarks, however, by way of justifying the payment of more for anything than it was necessary to pay for it?

Ex-Secretary TRACY. Not at all.

The CHAIRMAN. That is another matter. That will come later on.

Senator HALE. What did you do next?

Ex-Secretary TRACY. After this report of Sicard's, in May, showing that they could not begin to deliver armor for eighteen months, and finding from examination in England that the largest armor establishments there did not turn out more than 300 tons a month, having the authorization to build three battle ships and three large cruisers which would require about 14,000 tons of additional armor, as estimated, I felt it necessary to found, if possible, a second armor plant, because at 300 tons a month for each establishment, both furnishing, they could only furnish armor enough to build about two battle ships a year. The *Indiana* has on it about 3,060 tons of armor. At that rate two establishments would furnish only a little more than enough to build two battle ships.

Senator HALE. About 7,000 tons a year?

Ex-Secretary TRACY. Yes; I had an interview with Mr. Abbott, of Carnegie, Phipps & Company, on the subject of their undertaking the manufacture of armor. We entered upon a negotiation for that purpose, and that negotiation ran along through the summer and into the fall of [illegible] contract with Carnegie is in November, 1890. We began in [illegible]er of 1890 to negotiate with Carnegie.

Senator [illegible] You did not begin to negotiate with Carnegie until after you had demonstrated these delays?

Ex-Secretary TRACY. No; I offered, in the first place, to give them a contract for 6,000 tons of armor, substantially what Mr. Whitney had given Bethlehem, if they would found a similar plant, but I wanted them to manufacture it at a less price. To my mind, of course, the price paid to Bethlehem seemed to be an excessive price, and I tried to make a better bargain. But Mr. Carnegie was positive and absolute that he would not make a different contract from that made with Bethlehem. He would not take it at one cent less price; and I found that I had to abandon it or make the same contract with him that Mr. Whitney had made with Bethlehem. I yielded that.

I finally consented that the prices and terms of the contract made with Carnegie should be the same as those made with Bethlehem, with one exception. I reserved the right to order the manufacture of nickel steel instead of all steel, if the Department should so elect, for by this time the development of nickel steel had progressed to such a point that it was exceedingly probable the Department would want to adopt nickel steel instead of all steel. I reserved the right to change to nickel steel, agreeing that in case the Department did change to nickel steel the difference in cost of manufacturing nickel steel instead of all steel, whether it should be more or less, should be ascertained, adjusted, and determined. The contract was made on the basis that it was a contract for all-steel armor. If nickel steel was to be manufactured, then the difference in cost was to be ascertained and allowed.

Senator HALE. Which did you consider would be the most expensive?

Ex-Secretary TRACY. I supposed that nickel steel would be more expensive than all steel, because there would be substantially the addition of nickel, the cost of nickel, and something in the manipulation of it. How much we did not know; no one knew at that time; but that was to be ascertained, and it was provided for by the contract. That difference was to be ascertained and determined by a board of naval officers.

In the meantime, and before this contract was concluded, the trial at Annapolis had taken place which had demonstrated the superiority of nickel-steel; the appropriation of $1,000,000 to purchase nickel-steel had been made, and I had made a contract for the purchase of a small quantity of nickel. I had also entered into negotiations with a Mr. Thomson, of the Orford Copper Company, for reducing nickel matte to an oxide of nickel for use. Mr. Carnegie said, "What about this patent for making nickel steel? They demand a royalty of 2 cents a pound, and if you are determined to make nickel steel you must pay that royalty as a part of the increased cost of the manufacture." I said, "Mr. Carnegie, I can not pay a royalty of 2 cents a pound for nickel steel. It is absurd; I will not pay it." "Well," he says, "I can not undertake the contract unless you do."

There was a hitch in the negotiation, and finally it was agreed that the Department should indemnify Mr. Ca[illegible]egie against the claim of the nickel patent. The arrangement [illegible] contract [illegible] resorted to for the purpose of securin[illegible] point. I saw see by it that the Government does [illegible]ing a different unless he is sued and the patent is maintai[illegible] against him. Then he is to be indemnified [illegible] whether the price ery and the necessary cost of defense—[illegible] 3-inch plate or sued him and recovered 1 cent a pound [illegible] pay that 1 cent a pound and the necess[illegible].

Senator PERKINS. But in the contract with the [illegible] way that he had they not agreed to protect the Government ag[illegible]

Ex-Secretary TRACY. I will come to that in a [illegible] with Carnegie is simply a contract of indem[illegible]ons were entirely less. Information that I had received l[illegible] the novelty of that Schneider patent. [illegible]g this plant; and I sure that we were not to infringe it, be[illegible]dgment (and it is a entirely different from the process po[illegible]here) the existence of third place, I did not believe the ro[illegible]facture of armor is worth cents a pound, and I would not sub[illegible]ited States has paid for not allow a patentee to hold up the [illegible]e done nothing. ated as we were, to demand what [illegible] a ton? Hence I made the contract. [illegible]eived a ton. With-

I see it suggested that the Gove[illegible]ferent terms with Carnegie from what they made with Bet[illegible]. Bethlehem's contract with my predecessor was to manufactr[illegible]ll-steel plates. They never had agreed to manufacture nickel-steel plates.

Senator HALE. Nickel was not among the possibilities then?

Ex-Secretary TRACY. Nickel was unknown for such purposes at that time. I could not compel them to manufacture nickel-steel plate if they refused to do it.

Senator BACON. You are speaking of Bethlehem now?

Ex-Secretary TRACY. Of Bethlehem. But I said to them, "If you will do it, I will do with you just as I do with Mr. Carnegie; I will pay you whatever additional expense you are subjected to in consequence of manufacturing nickel instead of all steel;" and that was arranged and determined by a board of naval officers for both of them.

Now, Bethlehem never suggested to me, and I never heard of the suggestion until I read it in the resolution in this connection, that they had to pay anything to Schneider for royalty for the use of nickel; and I should like to ask, if Senator Chandler will permit, upon what authority it is now assumed that Bethlehem ever paid a cent to Schneider as *royalty under the nickel* patent.

Senator CHANDLER. Do you want to interrogate me?

Ex-Secretary TRACY. Not unless you desire to give me an answer.

Senator CHANDLER. I am ready to be interrogated if you wish it.

Ex-Secretary TRACY. I say I should like to know upon what authority that is stated, because I never heard of such a thing until I read it in the resolution authorizing this investigation.

Senator CHANDLER. I have few secrets. Lieutenant Meigs told me they had paid a large sum, between $600,000 and $1,000,000, for the use of the same patents, which in the Carnegie contract you provided this fund of 2 cents a pound to indemnify them against.

Ex-Secretary TRACY. I will venture to say that that is entirely a misapprehension. Schneider was interested in the original contract with Bethlehem.

Senator HALE. For all steel?

Ex-Secretary TRACY. The contract for all-steel armor made in 1887 [illegible] was the original manufacturer of all-steel furnish only a [illegible] it was common knowledge in the Depart-

Senator HALE [illegible] undisputed, and I have had it from Beth-

Ex-Secretary [illegible] making this contract with Secretary Whitney Carnegie, Phipps [illegible] with the Schneiders by which the Schneimanufacture of a [illegible] their information, all their appliances, pose, and that [illegible] to be used by it in performing this fall of [illegible] armor. began in [illegible] Have you any knowledge as to whether Mr. Whit-

Senator [illegible] ing this contract with the Bethlehem Company, after you had de[illegible]ld make an arrangement with Schneider?

Ex-Secretary T[illegible] do not know about that.

contract for 6,000 t[illegible]er hear that?

given Bethlehem, [illegible] do not think I ever did, but that they did them to manufactur[illegible]mon knowledge everywhere. As I say, price paid to Bethlehe[illegible]d me to insist, with Commander Barber, make a better bargain. [illegible] an all-steel plate for the competitive that he would not make [illegible]rfectly well that the Schneiders are lehem. He would not tak[illegible]doubtless they expect to be interested I had to abandon it or ma[illegible]ly make. I do not know the extent ney had made wit[illegible]imited to this particular contract or whether it applies [illegible] That I do not know, but they are interested in this contract, and I say that no armor will be let until after there has been a competitive trial."

Senator HALE. Was it your understanding that the interest of the Schneiders in the contract was in the building of a plant, or in what way was it your understanding that the Schneiders had the interest you speak of in the Bethlehem plant?

Ex-Secretary TRACY. I never saw the contract, and I have no knowledge beyond the fact that it was always said and always understood that they were interested in the proceeds of that contract. I never supposed that they were the joint owners of the plant, but I assumed, without knowing it, that Bethlehem was to build the plant and they were to furnish Bethlehem with all their knowledge, experience, methods, appliances, etc., and in consideration of that Bethlehem was to pay them so much money.

Now, I want to repeat that when I was negotiating with Bethlehem for the making of nickel-steel armor no suggestion was ever made to me that they would be liable to the Schneiders for a royalty for their patent. I never heard of such a thing, and I always assumed that it was not so because of the obligation that the Schneiders were under in the original

arrangement made in 1887, by which they were to furnish Bethlehem with everything they had. I am very sure that I have been told by the Bethlehem Company that the Schneiders were bound to furnish them everything that they had or knew on the subject of the manufacture of armor.

Senator CHANDLER. For nothing?

Ex-Secretary TRACY. No; but for what Bethleham had originally agreed to pay them as the consideration of the agreement of 1887. That was a part of their original agreement.

Senator CHANDLER. The details of that you know nothing about?

Ex-Secretary TRACY. I know nothing about the details.

Senator HALE. Do you not consider it likely that the large amount Lieutenant Meigs refers to, instead of being for royalty for the Schneider patent, was for information and valuable assistance derived from the Schneider Company?

Ex-Secretary TRACY. I have no doubt that is what he refers to, and I will venture to say——

Senator TILLMAN. Where is Lieutenant Meigs?

Ex-Secretary TRACY. Bethlehem will know the terms of the agreement. Fritz is here, and will know all about it. A more honest man does not live. You may take with absolute certainty anything he says about it.

The CHAIRMAN. That is true of John Fritz.

Ex-Secretary TRACY. But the suggestion that Bethlehem ever paid anything or that anything was ever demanded of Bethlehem as a royalty for this patent I never heard of until I heard it here.

Senator CHANDLER. Let me ask you a question, if you are willing to be interrogated on this point.

Ex-Secretary TRACY. Certainly.

Senator CHANDLER. They made a demand for royalty on Carnegie, Phipps & Co.?

Ex-Secretary TRACY. Oh, yes.

Senator CHANDLER. And have not made a demand upon the Bethlehem Company, as far as you know?

Ex-Secretary TRACY. Not as far as I know.

Senator CHANDLER. Can you tell the reason why they made no demand upon one company and did make a demand upon the other?

Ex-Secretary TRACY. Because Bethlehem claimed the right to manufacture under that patent, under and in pursuance of its original arrangement of 1887 with the Schneiders. I know nothing about it, but that has always been my assumption.

Senator CHANDLER. Then was not this the state of the case when you made a contract with Carnegie, Phipps & Co., that you paid them the same prices that were paid to the Bethlehem Company?

Ex-Secretary TRACY. Yes.

Senator CHANDLER. And in addition provided this fund of 2 cents a pound?

Ex-Secretary TRACY. Yes.

Senator CHANDLER. Assuming that the Bethlehem Company had already obtained the right to use this patent process from the Schneiders and had paid them for it?

Ex-Secretary TRACY. No.

Senator CHANDLER. Why not?

Ex-Secretary TRACY. Assuming that they already had the right to call upon Schneider not only for all he knew at the time of making the agreement of 1887, but for all of the improvements that he made from

time to time in the manufacture of armor; and I assumed that they were to be put to no expense because of that royalty of the patent, for if they had they would have claimed it of me. If Bethlehem had said to me, as Mr. Carnegie did, "Here is this patent; we can not manufacture under that patent and subject ourselves to a royalty," and had said, "We will not manufacture nickel steel for you unless you will indemnify us against that patent," I should have been compelled to throw up the whole thing or do with them as I did with Carnegie, namely, agree to indemnify them. But no such claim was made by Bethlehem.

Senator HALE. You supposed that the larger arrangement they had made with the Schneiders, covering the interest of the Schneiders in the profit and in the contract, covered patents and everything else?

Ex-Secretary TRACY. Yes; everything that they had.

Senator HALE. And royalties?

Ex-Secretary TRACY. Yes; and I have not a particle of doubt about it to-day. I should be compelled to confess myself more mistaken than I have ever been if that is not the fact.

Senator TILLMAN. I was absent for a few minutes, having been called out of the room unavoidably, and you may have touched upon the point; but let me ask on what, in making your contracts with the Carnegies, you based your action as to price?

Ex-Secretary TRACY. You were out, Senator. I said when I came to negotiate with Mr. Carnegie the negotiation began with Mr. Abbott, the manager of their works; and when Mr. Carnegie came into it later I started by insisting that they should reduce the price that was paid to Bethlehem. I thought that was an excessive price, and I wanted them to reduce that price.

Senator TILLMAN. Did they mention as a reason why they could not reduce the price that they would be at a great expense?

Ex-Secretary TRACY. Of course.

Senator TILLMAN. Which would have to be considered in undertaking the contract?

Ex-Secretary TRACY. Yes.

Senator TILLMAN. Did they give you any estimates?

Ex-Secretary TRACY. Oh, yes; verbally. No estimates in detail.

Senator TILLMAN. Can you recall the amount roughly, generally?

Ex-Secretary TRACY. I think it was more than $2,000,000 that they would have to expend.

Senator TILLMAN. That they would have to expend over and above their existing outlay?

Ex-Secretary TRACY. Yes.

Senator TILLMAN. Before they could make the armor?

Ex-Secretary TRACY. Yes. I will not be positive about the precise figure. However, it was a very large sum.

Senator HALE. They had a large plant for other purposes?

Ex-Secretary TRACY. They had a large plant.

Senator TILLMAN. I knew they had a large plant. I am trying to get at what ought to be the present price of armor after the Government has practically paid for these plants in the original contracts. That is the point I want to strike.

Ex-Secretary TRACY. As I stated, Mr. Carnegie said flatly, "I will make no contract unless I can have the same terms that are accorded to Bethlehem, at the same prices and substantially the same quantity of armor. If you will give me that, I will found the plant; if you do not, I will not."

Senator TILLMAN. Did your experts, those who reported to you in regard to the delay in furnishing the armor and complying with the original contract of the Bethlehem Company, ever lead you to suppose that there was any intentional procrastination?

Ex-Secretary TRACY. No; not willful.

Senato TILLMAN. Was it necessary?

Ex-Secretary TRACY. Necessary in one sense. In the founding of that plant Bethlehem sought very largely to make its own tools instead of purchasing them. Then they had made great mistakes with their hammer. No; I am not willing to charge Bethlehem at all with any willful delay. The delay was very great; but I think the Senator was out when I stated that one of the controlling factors which led me to think it desirable to found a second plant was because the experience of the English armor makers is that in their largest establishments they turn out only about 300 tons a month each, and at 300 tons a month two establishments could manufacture armor for only about two battle ships a year the size of the *Indiana*.

Senator TILLMAN. This is merely a question as to your opinion, but let me ask you whether from your intimate knowledge of the matter you have any reason to believe that those two companies are in collusion or that they at that time had an understanding with each other?

Ex-Secretary TRACY. No; not at the time of making the contract, of course. I do not want to pass upon that question. I have no evidence sufficient to justify me in saying that they were in collusion. We were required to advertise for the materials.

Senator TILLMAN. Did any other steel makers make any propositions or come to you?

Ex-Secretary TRACY. There is no one else in the country who has a plant, and so others could not compete.

Senator TILLMAN. None except Carnegie and the Bethlehem Company.

Ex-Secretary TRACY. They are the only two plants in the country that can compete.

Senator TILLMAN. Are we then to-day practically forced to buy from those two or none?

Ex-Secretary TRACY. We are.

Senator HALE. Unless we build a plant of our own?

Senator TILLMAN. Or unless there are others who would go to the expense those firms have gone to?

Ex-Secretary TRACY. Yes, sir; that is it, unless you found another plant.

Senator TILLMAN. I just want to get the idea of a monopoly or of a combine between those companies brought out prominently in the investigation.

Senator CHANDLER. Without reference to a combine, it is admitted that those two companies are the only ones now that can compete?

Senator TILLMAN. I am not speaking of the present time.

Ex-Secretary TRACY. You do not understand me as saying that there is any combine.

Senator TILLMAN. I am trying to bring out the facts that will prove that, however.

Senator HALE. At the time when, under the circumstances you have stated, you made the arrangement which resulted in the establishment of the second plant, was there anything that indicated any collusion or sympathy or correspondence between the Carnegies and the Bethlehem Company, or do you believe now that there was anything of the kind?

Ex-Secretary TRACY. No; there was nothing at the time.

Senator HALE. On the other hand, was it not considered by you that you could create an additional and rival establishment to the Bethlehem Company?

Ex-Secretary TRACY. Yes, sir. I have assumed that if this Government had followed the practice of England and appropriated $100,000,000, or even $75,000,000, to a building scheme, to be expended so much per year during a series of years, the cost of our ships in every respect could have been greatly reduced, because more people would have gone into the business of furnishing the frames of ships, the plates of ships, the decking; more men would have gone into the projectile business; more armor men would have gone into the armor business. We could really have got up an active competition under a guarantee of constant and continuous employment for a series of years. But where you ask a man to found an expensive plant, costing millions of dollars, on a very small contract, with nothing more than a mere probability that something may afterwards follow, of course he is likely to exact a much higher price for that one contract.

Senator HALE. That is true.

Ex-Secretary TRACY. I assume now that if the present Congress should authorize the building of four more battleships in addition to the two being built, the present Secretary of the Navy could negotiate a contract for armor at considerably less than the present prices.

But I started, allow me to say to Senator Perkins, with the same impression he has. I knew what ordinary steel cost, and I could not reconcile my judgment to the fact that the armor was costing this amount of money. Of course, I recognized the cost of plant, interest, and depreciation of plant, but there is this fact which I learned very soon after, that a great deal of the cost of the armor plate is in the machining of it. The plates are exceedingly hard; it consumes a great deal of time, and the cost of machining, especially of the nickel-steel harveyized armor is very great. All armor is expensive in that direction. One of the big items is the machining, and it makes it impossible to turn out any large quantity of armor——

The CHAIRMAN. By "machining," you mean the shaping and fitting together of the plates?

Ex-Secretary TRACY. Yes, sir. You can forge any amount of armor you choose. You can forge it like you can forge anything else, but you can only put so many machines on a piece at a time.

Senator CHANDLER. Because there are hardly more than two pieces of the same kind and shape; one on one side of the ship and one on the other side.

Ex-Secretary TRACY. They have to shape them in all sorts of shapes.

Senator CHANDLER. Does the contract provide for shaping?

Ex-Secretary TRACY. Yes, sir; for shaping, bending, and twisting. One of the most expensive armors we have is what to the lay mind would seem to be the cheapest, and that is the gun shields, the bending and fitting of the thin, hard armor. It is much more expensive per ton than thick armor.

Senator HALE. So the prices of ordinary steel furnished for commercial purposes bear no relation to armor?

Ex-Secretary TRACY. Not at all. Yet, of course, I can not help but believe that if the armor makers could have constant and continuous employment for their plants and employ their men for any considerable length of time, they could afford, and the present Secretary would compel them, to reduce the cost of armor. But if it is only spasmodic, here and there, a battle ship now and a battle ship then, with their force

scattered and having to be gathered together when a job comes, of course we must always expect to pay a much larger price, and our ships will cost much more than they would if what I deem would be an intelligent policy were adopted. If you declare your scheme in advance, say, "We will expend such a sum of money on building ships, not more than $10,000,000, $15,000,000, or $20,000,000 to be expended a year," it would be a building programme, and everybody would work to that programme, and everything would be greatly cheapened.

I never doubted that during my time I could have reduced the cost of the ordinary steel that goes into a ship 25 per cent if I could have given any assurance of permanent and extensive employment to people who would consent to go into the business.

Senator HALE. That would involve permanent and large appropriations.

Ex-Secretary TRACY. Yes.

There is another thing which you must bear in mind in connection with our Navy. The standard of steel that we use in the construction of ships is much higher than even England uses. It is far in advance of the mercantile steel. When some tugboats were ordered, I undertook to build them with the Navy inspection of steel; and I could not build them at all. Nobody would bid on them, and I was compelled to come down to the commercial standard of steel before I could get any bidders.

Senator HALE. It does very well for that kind of a vessel?

Ex-Secretary TRACY. It does very well; well enough. But I undertook to build them on the Navy standard. I could not get any competition; I could not get a bid, practically. Nobody would bid.

Senator HALE. You have gone on now and have talked about nickel steel. You have not touched upon the other subject yet.

Ex-Secretary TRACY. Let me complete my statement as to this matter, and then I will go to the other subject in a moment.

When this question was mooted to Mr. Carnegie, he refused to make the contract unless I would make this indemnity. I made it. I had a doubt as to the validity of the patent, and a moral certainty that we were not infringing and were not going to infringe the patent; and I knew that a royalty of 2 cents a pound was excessive anyway, and they could not recover 2 cents a pound even as the result of litigation.

I supposed the litigation would be instituted at once, but from the time I made the contract I never heard of a suggestion of litigation until about the time I was going out of office. I supposed they had abandoned it and had become perfectly satisfied that we were not infringing, for when I came to make the second contract with the Bethlehem Company and with Carnegie, in 1893, neither of them suggested any indemnity for the nickel patent. The second contract with Carnegie does not embrace the indemnity at all, nor does the contract with the Bethlehem Company.

Senator CHANDLER. The contract with the Bethlehem Company is dated March 1, 1893, and that with the Carnegie Company is dated February 28, 1893?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. There the usual indemnity clause is to be found, except as to the Harvey process?

Ex-Secretary TRACY. There Carnegie agreed to indemnify the Government against all patent processes except the Harvey process, which we had a right to use for a definite period.

Senator HALE. So that question had disappeared?

Ex-Secretary TRACY. It had disappeared and gone out of everybody's mind.

Senator CHANDLER. In the meantime the $260,000 fund under the first contract had accumulated?

Ex-Secretary TRACY. No. When I went out of office he had not delivered any great amount of armor.

Senator CHANDLER. It was provided for?

Ex-Secretary TRACY. Of course. But the fact that Mr. Carnegie made no mention of it in connection with the second contract led me to suppose that it was understood that no litigation was to be commenced at all under the contract, and none was commenced until last summer.

When I was in Europe last summer I received word from my firm that suit had been brought against Carnegie; that Carnegie had brought the papers to our office to defend, and that the Government had employed a patent lawyer also to defend the suit.

Senator HALE. Who brought the suit—the Schneiders?

Ex-Secretary TRACY. Schneider brings the suit.

Senator HALE. Where did he bring it?

Ex-Secretary TRACY. In the circuit court of Pennsylvania, I assume. Yes; at Pittsburg.

Senator CHANDLER. Under American patents for these processes?

Ex-Secretary TRACY. Under American patents for these processes.

Senator CHANDLER. When were the patents taken out?

Ex-Secretary TRACY. They were taken out some time in 1890, I think; 1889 or 1890; 1889, is it not?

Senator CHANDLER. I do not know.

Ex-Secretary TRACY. I am not sure. Now let us go back to Harvey.

Senator HALE. You have made a most interesting statement in regard to all the transactions covering the introduction of nickel into armor. Now, will you give us an account, as briefly as you can as a lawyer, of the harveyizing process; how it came to the attention of the Department; the reasons that led to its adoption, and the importance and value of the process in your judgment which led you to do whatever was done in the way of adopting it and paying for it?

Senator CHANDLER. Mr. Tracy has already done that, Senator Hale, as to the Harvey process.

Ex-Secretary TRACY. I did that at the beginning of my statement. I alluded to Mr. Folger's calling my attention to it, and I have gone on to the time when we demonstrated its complete success at the last trial at Bethlehem.

Senator CHANDLER. Now, from that point go on.

Senator HALE. You have not stated of what importance you deemed that process to be, small or great; the novelty of it, so far as you are concerned, but not as a matter of patent, and the general reasons that led you to its adoption.

Ex-Secretary TRACY. The general reason that led to the adoption of it was that in the judgment of Mr. Folger and myself it was making the ideal armor plate, a hardened surface upon a homogeneous mass of steel, and the value of the patent was beyond computation, almost.

I hold in my hand now an address delivered by C. E. Ellis, associated with John Brown & Co., Limited, of London, and one of the large firms of compound-armor manufacturers in that country, delivered in 1894 before the institute, I think, in which——

Senator CHANDLER. Give the title page, the date, and everything.

Ex-Secretary TRACY. It was delivered before the Institution of Naval Architects. In the address, after discussing all sorts of armor and the

improvements that had been made in it, coming down to the Harvey armor, he discusses that, and there is no more skilled person in the world on armor than Mr. Ellis. He estimates the superiority of the harveyed armor over the best armor in use previous to its adoption as 50 per cent.

With the above facts before us—

He says—

We are enabled to form some idea of the improvements that have recently been effected in armor-plate manufacture, and of the relative value of the various kinds of armor. Without disregarding the excellent qualities of the steel and nickel plates which I have alluded to earlier in this paper, I think I have shown that harveyed armor would be a more efficient defense to the vital parts of any ship of war, whether battle ship or cruiser, than any other type of plate. Opinions may differ as to the percentage of superiority it possesses, but I do not think I am overestimating its value when I place its resisting power at 50 per cent above the steel and compound plates of 1888, which I have chosen as a basis of comparison.

This advantage can be used by the naval architect in one of two ways: he can either clothe with armor a greater part of his ship, or he can obtain greater resistance, keeping the same thickness of armor. The new development is, therefore, of the greatest importance, and it will be a matter of satisfaction to this institution that the British Admiralty have been the first naval authority in Europe to realize the value of this new form of armor and to apply it to their most recent designs.

I think that is a fair estimate of the superiority of the Harvey armor over the best compound armor of England.

Senator PERKINS. Fifty per cent?

Ex-Secretary TRACY. Fifty per cent.

Speaking of armor, as illustrated in our own case, I may say that the thickness of the plates to be put upon the *Indiana* was determined before we had fully tested the harveyed armor, and it was fixed at 18 inches in thickness. We put it on that way. But after fully testing the harveyized armor when we came to build the *Iowa*, we reduced the thickness of the armor, as we thought we safely might, to 14 inches.

Senator HALE. Fourteen inches instead of 18 inches?

Ex-Secretary TRACY. Fourteen inches instead of 18 inches. Mr. Herbert, I understand, has done the same thing as to the ships that are now authorized, and all Europe is doing the same thing, and even more than that.

Now, take 14 against 18, that is about 22½ per cent of saving in weight——

Senator PERKINS. There is a saving in weight to that extent?

Ex-Secretary TRACY. Yes. There are 3,060 tons of armor on the *Indiana*.

It would be difficult to compare the *Iowa* and the *Indiana*, owing to the fact that the former vessel is of about 1,000 tons greater displacement than the latter, and has a greater protected area.

A true comparison, however, may be obtained in the following manner:

The ballistic resistance of a harveyed armor plate is at least as great as that of a nickel-steel plate of 20 per cent greater thickness, and we know by actual tests that for any given protection we can save at least 20 per cent of armor weight by the use of the Harvey process.

The *Indiana* class having been designed to carry 2,679 tons of nickel-steel armor, the introduction of the Harvey process would have allowed giving them at least equal protection on a weight of 2,143 tons. The cost of the 2,679 tons of nickel-steel armor would have been $1,578,962, while the cost of 2,143 tons of harveyized armor, including royalty and every other expense, would have been $1,395,093, and the resulting saving would have been $183,869 on the armor alone.

But in reducing armor weights by 536 tons we can also reduce hull weights, still retaining all the offensive and defensive qualities, speed, coal endurance, etc., unchanged. This saving of hull weights would be at least 300 tons, costing about $140,000.

Consequently the introduction of the Harvey process enables us to save $323,869 on a single ship of the *Indiana* class.

We have reduced the weight of the armor on the *Iowa* to 2,300 and some odd tons. We have saved 600 and odd tons of armor on those two ships.

Senator HALE. You saved the price of that much armor per ton simply on weight?

Ex-Secretary TRACY. On weight.

Senator PERKINS. On the reduction in weight?

Ex-Secretary TRACY. On the reduction in weight.

Senator PERKINS. And you have the same resisting power?

Ex-Secretary TRACY. We have the same resisting power.

Senator HALE. According to Mr. Ellis, you have a great deal more resisting power.

Ex-Secretary TRACY. Yes, sir. According to Mr. Ellis, we would still have 25 per cent greater resisting power than in 18 inches of ordinary armor. Now, if you will call the six hundred and odd tons of armor saved worth even $400 a ton, we have made a direct and actual saving of $260,000. But that is not all the saving. The six hundred and odd tons saved give so much additional weight to be used in the ships. If you do not use it otherwise you can add 600 tons to the coal capacity of the ship. Your ship will then carry 600 tons more of coal. If you will estimate what the cost of adding 600 tons to the hull of a ship would be, you will see that you have another great saving, for by no possibility could you call this less than $250 a ton. Thus you have 250 times 600. The actual saving by the Harvey process in the production of such a ship is not less in value than $400,000.

Senator HALE. For each ship?

Ex-Secretary TRACY. For each ship.

Senator PERKINS. With about the same tonnage?

Ex-Secretary TRACY. Involving the same tonnage—taking a ship of the same tonnage, of the *Indiana's* class——

Senator PERKINS. And you have the same resisting power in armor plate 14 inches in thickness that you would have with armor plate 18 inches thick?

Ex-Secretary TRACY. Yes, sir. The 14-inch armor, harveyized, is equal to 18 inches of the compound plate.

Senator PERKINS. Yes; and according to Mr. Ellis it is even very much greater; it is 25 per cent more.

Ex-Secretary TRACY. Is even much greater, as you say.

Senator BACON. It would not be 25 per cent; it would not be that much.

Ex-Secretary TRACY. The great value of this armor can not be doubted, when within a year after its perfection here it was adopted everywhere, by every naval power in the world. No other sort of armor is used or is thought of being used to-day than the harveyized armor.

Senator HALE. Had it ever been thought of before?

Ex-Secretary TRACY. It was never heard of before.

Senator HALE. So it was an absolute novelty.

Senator TILLMAN. I wish to ask you a question which is not pertinent to the inquiry, but I ask you for my own information. On any of the old vessels in the British navy or in any other navy, that of France or

Germany, for instance, which were constructed before the discovery of the value of nickel steel, has the inferior armor been replaced by nickel armor?

Ex-Secretary TRACY. Not to my knowledge. Both England and France, and I think you may say it is true of other naval powers, have been building ships with the new armor and have been using the utmost capacity of their establishments since it came into use.

Senator TILLMAN. I will state the object of the question: With the old armor, which is necessarily inferior, it naturally follows that those vessels are not the equal of the vessels built now——

Ex-Secretary TRACY. They are not, by any manner of means.

Senator TILLMAN. In power of resistance?

Ex-Secretary TRACY. Nothing like it.

Senator TILLMAN. Or ability to cope with vessels armored with nickel steel?

Ex-Secretary TRACY. Nothing like it.

In this desultory talk I have brought my remarks up to the point where the armor was adopted, and I have spoken of its value. I have never doubted its value. It was recognized the world over as an absolute novelty in armor.

Senator HALE. You are now referring to the harveyized process?

Ex-Secretary TRACY. Yes; the harveyized armor. It is so accepted. I regard and have always regarded the development of that armor as marking a new epoch in the history of naval development in this country.

Senator PERKINS. It was impressed upon us at the first meeting, when Secretary Herbert was present, that exorbitant prices had been paid to Carnegie and to the Bethlehem Company (at the rate of $500 per ton), for the reason, if no other, which was developed, that those companies had made a contract with a foreign Government to furnish the same armor at less than $300 a ton.

Ex-Secretary TRACY. I have heard of that. I know nothing about it.

Senator PERKINS. It is hard for me to reconcile that fact with the statement that the firms have not formed a combination whereby they have taken advantage of the necessities of our Government.

The CHAIRMAN. That is another subject, and we may come to it later on.

Ex-Secretary TRACY. I shall be glad to answer any questions which members of the committee may desire to ask.

Senator HALE. When did Commodore Folger become Chief of the Bureau of Ordnance, having before that been in charge of inspection at the Washington Navy-Yard?

Ex-Secretary TRACY. In 1890.

Senator HALE. Was he in office when you left the Department?

Ex-Secretary TRACY. No; he resigned from the Bureau about the middle of December and asked a leave of absence for two years. He was absent on that leave of absence when I left the Department.

The CHAIRMAN. Do you mean December, 1893?

Ex-Secretary TRACY. December, 1892. He left the Bureau on the 1st of January, 1893.

Senator CHANDLER. That is right.

Ex-Secretary TRACY. December, 1892, is the date of his resignation, and he left on the 1st of January, 1893, I think.

Senator PERKINS. While on leave of absence he drew two-thirds pay?

Ex-Secretary TRACY. He drew leave of-absence pay.

Senator CHANDLER. Mr. Tracy, you are now in private life?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. Engaged in the practice of law in New York City?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. State the name of your firm.

Ex-Secretary TRACY. It is Tracy, Boardman & Platt.

Senator CHANDLER. Is James R. Soley connected with your firm in any way?

Ex-Secretary TRACY. Yes.

Senator CHANDLER. You accepted this employment from Carnegie, Phipps & Co., to oppose the validity of the Schneider patent?

Ex-Secretary TRACY. Not only to oppose its validity, Senator, but also to deny the fact that we had infringed their patent, and then to contest the value of the royalty if they were entitled to any.

Senator CHANDLER. You are counsel now in the whole question covered by the contract?

Ex-Secretary TRACY. Yes, sir; for Carnegie.

Senator CHANDLER. Are you also counsel for the Harvey Steel Company?

Ex-Secretary TRACY. Yes.

Senator CHANDLER. What is your function in that case?

Ex-Secretary TRACY. The function of a lawyer, I suppose; to w... my case if I can.

Senator CHANDLER. I mean, what is the point of litigation, and what side are you on?

Ex-Secretary TRACY. I understand it is litigation brought by the Harvey Steel Company to restrain the infringement of its patent by the Bethlehem Company.

Senator CHANDLER. Now, if you will be kind enough to state which side of that litigation you are on I shall be obliged to you.

Ex-Secretary TRACY. I am for the Harvey Company.

Senator CHANDLER. The address of Mr. Ellis, I see, is an exhibit in the case in the "United States circuit court, eastern district of Pennsylvania, Harvey Steel Company *v.* The Bethlehem Iron Company. In equity No. 10; April session, 1895."

Ex-Secretary TRACY. Yes.

Senator CHANDLER. How long is it since you were employed as counsel for the Harvey Steel Company?

Ex-Secretary TRACY. I received my retainer in February a year ago, I should say. I was taken sick right after receiving it, and the last work I did before leaving for Europe in the March following, March of last year, was to sign the complaint. Then I had nothing to do with the matter until I returned this fall.

Senator CHANDLER. What did you sign?

Ex-Secretary TRACY. The bill for an injunction.

Senator CHANDLER. In the Harvey case?

Ex-Secretary TRACY. In the Harvey case, to enjoin the Bethlehem Company from infringing their patent.

Senator CHANDLER. Now, will you please go back to the Carnegie contract. With whom did the idea or the project of making the contract with Carnegie, Phipps & Co. for the establishment of an additional plant for the manufacture of armor originate; with the Department or with Carnegie, Phipps & Co.?

Ex-Secretary TRACY. I have myself been trying to recall that. I have not had access to the Department or to its documents, and I can not recall whether I wrote to the Carnegie Company or whether they

called on me. The first thing that I remember distinctly about it is that Mr. Abbott, of their concern, was in the Department. There may be something in the Department which will show how that is, but I have not been to the Department since I left it, and it is a matter that I can not recall.

They may have known of the delays and have understood the situation and have voluntarily come to suggest the making of a contract, or I may have sent for them; I can not tell which.

Senator CHANDLER. Can you remember this? Is it in your mind whether they were pressing to have the contract made or you were following them to make the contract which you thought ought to be made?

Ex-Secretary TRACY. I think Mr. Abbott, who first negotiated with me, was quite disposed to make the contract, but when Mr. Carnegie, the head of the firm, came to be consulted, he was not disposed to make it at all. He fixed the terms, and beyond them he would not go. He controlled the negotiation from the time he came into it.

I wish to say at this point that I did not know anybody connected with that firm. I never had seen Mr. Carnegie until I saw him in the Department. It was the first time I saw him in my life. I knew nobody else in that firm. Therefore I think Mr. Abbott came to me voluntarily and suggested whether or not we would attempt to found another plant. But I will not say certainly about it, for my memory is at fault there.

Senator CHANDLER. As to Mr. Carnegie, do you desire to convey the impression that he was rather averse to making the contract after you had urged him to do so, or that you and he were each equally desirous of bringing it about?

Ex-Secretary TRACY. I did not urge him to make the contract. The terms that I was negotiating with Mr. Abbott, and which I hoped to secure were vetoed by Mr. Carnegie. That related to the price. He would not consider at all the question of taking a contract upon any other terms than those of the Bethlehem Company.

Senator CHANDLER. That was his ultimatum from the start—as good a contract as the Bethlehem contract, with respect to price?

Ex-Secretary TRACY. That was the ultimatum when the negotiation passed into his hands.

Senator CHANDLER. Yes; I understand. Now, if you recollect, please state when the first conversation or negotiation in reference to indemnity against the nickel-steel patent first arose, and with whom.

Ex-Secretary TRACY. It arose, I should say, about the time the contract was concluded. It was about the last hitch, I remember, in the contract.

Senator CHANDLER. How did it come about, if you remember; did he come to you or did you mention it to him?

Ex-Secretary TRACY. He mentioned it to me. You remember that his contract is on the basis that it is a contract for all-steel, with the right on the part of the Department, if it desired, to direct the manufacture of nickel steel. It was on the question of the option of the Government to exercise that right that he said, "But if you exercise that right, here is the nickel patent, and the patentee is demanding 2 cents a pound royalty. Now, if I am to pay the royalty I shall have to ask an increased price. If you will indemnify me against the royalty it is all right, or if you will pay the royalty it is all right."

Senator CHANDLER. You then consented, at his request, to insert this provision in the contract?

Ex-Secretary TRACY. I said to him, "I will not consent to pay you the 2 cents a pound royalty for the armor. I shall not consent that

anybody shall pay a royalty of 2 cents a pound to that company. It is not worth it; it is too much." And after negotiation as to how it could be done I undertook to make the indemnity.

Senator CHANDLER. In this form?

Ex Secretary TRACY. In this form.

Senator CHANDLER. Then you originated the idea of contesting the patent?

Ex-Secretary TRACY. Yes, I think so; that is, I originated the idea of refusing to pay 2 cents a pound royalty.

Senator CHANDLER. For the patent?

Ex-Secretary TRACY. For his patent.

Senator CHANDLER. And of providing this fund for the purpose of litigation?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. Will you state again, if you please, what knowledge you have as to the amount of the fund which this agreement provides for?

Ex-Secretary TRACY. My impression is that the value at 2 cents a pound would amount to about $240,000.

Senator CHANDLER. I am informed that it is about $260,000. Now, at that time, you knew, or supposed, that the Bethlehem Company had obtained the right to use those processes by their contract with the Schneiders?

Ex-Secretary TRACY. Yes; I did.

Senator CHANDLER. You supposed they had paid for it?

Ex-Secretary TRACY. No; I did not know that they had paid any specific sum for the right, because the patent was not in existence when they made their contract. I supposed, without knowing anything about the particulars of the contract, that the right to use the patent came from a general provision in the contract between Schneider and the Bethlehem Company, by which they were entitled to all the processes of the Schneiders and to any improvement and inventions that the latter might make from time to time.

Senator CHANDLER. Did you understand that the Schneiders were partners in the contract with the Government?

Ex-Secretary TRACY. I did not inquire, and I did not know whether the relation of partners existed between them. I do not know the details.

Senator CHANDLER. I am not asking you what the facts are, but I am asking you what your condition of mind was when you made the contract for the fund for litigation.

Ex-Secretary TRACY. The word "partnership" does not represent the relation that I supposed existed.

Senator CHANDLER. Did you have it distinctly in your mind that for a money consideration the Bethlehem Company had acquired from the Creusot people the right to everything that could aid them in this enterprise?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. Including the patent processes?

Ex-Secretary TRACY. Including, as I supposed, all patent processes.

Senator CHANDLER. Knowing that fact, did you, in making the arrangement with Mr. Carnegie, make any inquiry of the Bethlehem Company as to the amount that those rights had cost them?

Ex-Secretary TRACY. No; I was very sure that if it was not true they would make inquiry of me, and I was not seeking to indemnify people who were not asking it.

Senator CHANDLER. Exactly. The net result of it was, however, that you knew at the time that whatever the Bethlehem Company had paid for the right to use those processes, it would make the Carnegie contract, if you guaranteed against any such payment under his contract, a better contract to him to that extent.

Ex-Secretary TRACY. Not at all. I assumed on the contrary, that if the Bethlehem Company were entitled under their contract with the Schneiders to have the benefit of all the processes and inventions, my indemnity of Carnegie would place him exactly on a par with the Bethlehem Company.

Senator CHANDLER. Without his paying anything?

Ex-Secretary TRACY. They did pay for it——

Senator CHANDLER. You assumed that they paid something for those processes?

Ex-Secretary TRACY. I repeat, Senator, that I did not assume that they had paid anything for the nickel patent——

Senator CHANDLER. Did you assume——

Ex-Secretary TRACY. For the nickel patent was not in existence until more than two years after the contract with the Bethlehem Company was made. It was unknown at that time. But I did assume that by virtue of general words in the contract the Bethlehem Company were entitled to all the processes and improvements and inventions which might thereafter be made by Schneider, and that they were entitled to use them without compensation.

Senator CHANDLER. Then whether or not the right to use this process had cost the Bethlehem Company anything, leaving that in a state of uncertainty, you thought it expedient to indemnify Carnegie against it?

Ex-Secretary TRACY. I did not think that what the Bethlehem Company had paid or had not paid, had anything at all to do with my contract with Carnegie.

Senator CHANDLER. You intended to make a similar contract?

Ex-Secretary TRACY. If the Bethlehem Company had paid anything and claimed that amount as an extra cost for manufacturing the nickel plate, they would have said so to me, and the fact that they did not say so to me was conclusive evidence to my mind that they had not paid anything and did not pretend that they had paid for it.

Senator CHANDLER. Why should they so say to you? They had——

Ex-Secretary TRACY. Excuse me.

Senator CHANDLER. Let me put the whole question. They had already guaranteed you against all patent processes necessary to the manufacture of the armor?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. And you had the right, under your contract, to require armor of a certain kind. Why, then, did you assume that if they had paid anything for this process they would have mentioned it to you?

Ex-Secretary TRACY. For this reason. Their contract was for all-steel armor. I could not compel the Bethlehem Company to make nickel armor unless they consented to it. I agreed as a condition of their making nickel armor to pay for everything that it cost them beyond the making of steel armor.

Senator CHANDLER. In what contract?

Ex-Secretary TRACY. In the arrangement that was made by which nickel steel was substituted for——

Senator CHANDLER. At a later or earlier date than the Carnegie contract?

Ex-Secretary TRACY. Long after that.

Senator CHANDLER. I am speaking of the time when you made this contract.

Ex-Secretary TRACY. I know; but that was always understood. At the time of making the contract I talked with the Bethlehem people about the contingency of requiring nickel steel of them, and whether they would do it.

Senator CHANDLER. You knew they were paying large sums to Schneider for something?

Ex-Secretary TRACY. I supposed they were paying a sum. I do not use the word "large."

Senator CHANDLER. But you assumed that they were not paying anything for this process because they never said anything to you about it?

Ex-Secretary TRACY. No——

Senator CHANDLER. I am asking you to develop the reason why they——

Ex-Secretary TRACY. I stated to you, and I will repeat it, that I supposed they were not paying anything for the nickel process as such, because I supposed that in their contract made two years previous to that the Schneiders had by general words and language agreed to give to the Bethlehem Company the benefit, not only of all their present processes, but of everything that they should have. I do not think that I am mistaken in having been so informed by Bethlehem.

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Now, I assumed, and I had a right to assume, that if they were subjected to any extra expense in the manufacture of the nickel steel because of the patent, they would have presented that fact and claimed the amount as a part of the extra cost.

Senator HALE. Not to interrupt you, was not this the situation—if Senator Chandler will allow me?

Senator CHANDLER. I want a little chance myself, but I certainly will allow you to proceed.

Senator HALE. It happens to be appropriate at this point.

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Senator HALE. But with anybody else outside, the Schneiders had a right to make them pay. Is not that it?

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Senator CHANDLER. You heard it?

Ex-Secretary TRACY. That their royalty was 2 cents a pound.

Senator CHANDLER. By the way, do you know where Commander Barber is now?

Ex-Secretary TRACY. Is he not in Japan?

Senator CHANDLER. Do you know he has been placed on the retired list and is now the agent of Carnegie, Phipps & Company in Japan?

Ex-Secretary TRACY. No, I do not. I never heard of it before.

Senator CHANDLER. I am so informed. You had heard in the way you have stated that the Schneiders claim was 2 cents a pound royalty on this process. You knew as a fact that the Bethlehem Company had contracts with the Schneider people. You contemplated that in going on with the new contract which you and Mr. Carnegie were negotiating together, Mr. Carnegie would ignore all the Creusot patents and processes, and have no contract with them? Was that a part of your *understanding with him*?

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Senator CHANDLER. Then why do you not say you did contemplate that Mr. Carnegie would ignore the Schneiders?

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Senator CHANDLER. No; I asked as to ignoring all contracts with the Schneiders. Was it not distinctly understood between you and Mr. Carnegie that he was to go on and execute this contract without the necessity of any arrangement with the Schneiders?

Ex-Secretary TRACY. He was to go on and execute the contract, and I was to indemnify him, or the Department was, against any royalties that might be recovered against him up to 2 cents a pound, not beyond it. But in doing that, I repeat, I had doubts of the novelty of the Schneider invention. I had a very firm conviction that we were not going to infringe the patent at all and that, therefore, they would have no claim. I had further a very firm conviction that the royalty of 2 cents a pound was most excessive and absurd, and that I would not pay it anyhow.

Senator CHANDLER. And you communicated these views to Mr. Carnegie?

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Ex-Secretary TRACY. This is the first time you asked as to that point.

Senator CHANDLER. That is the first question I asked.

Ex-Secretary TRACY. No; it is not.

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would not be a contract so much the better for him than the contract with the Bethlehem Company.

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Senator CHANDLER. I will now come to the Harvey process. I will read two or three sentences from the article by Mr. Ellison, "Recent experiments in armor," in addition to what Mr. Tracy has read. I read on page 7:

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You have alluded to these experiments. Did you first know of the Harvey process from conversation with Commander Folger?

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Senator CHANDLER. Were you informed at that time that the Harvey patent only extended to making tool steel?

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Ex-Secretary TRACY. No.

Senator CHANDLER. You did not know that?

Ex-Secretary TRACY. No.

Senator CHANDLER. Did you know that his patent as it existed, which he was endeavoring to utilize by selling steel to the Navy Department, had resulted in the purchase of only about $300 worth of tool steel by the Department?

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When that subject first came up, and I was first applied to, I asked what was the practice of the Department about forwarding a letter asking that a patent be hastened, and I was told.

I conformed my action, as I supposed, to the precedents of the Department. My general recollection is, without having any specific knowledge as to any one of those cases which went through my Department, that the matter was in charge of the judge-advocate of the Department and was presented to me in the routine of the Department and acted upon by me.

Senator CHANDLER. Do you understand that these suggestions about expediting patents on technical matters usually came from the chiefs of bureaus?

Ex-Secretary TRACY. Yes, I assume so.

Senator CHANDLER. And you have no recollection whatever of this particular case?

Secretary TRACY. No; I do not recollect it. Of course, I know I did it, for I have read that list. I do not think I recall one in the list. Let me go over that list again. [Examining.] I assumed always from the time my attention was first called to it that the policy of the Department was, that if there was any claim of a patent on file that was likely to interfere with the Government's business, the sooner the Department knew of it the better; and after the first consideration of the subject I do not know that I ever gave any attention to any special particular case. I do not recollect any.

Senator CHANDLER. Take page 46 of the record, "Abstract of letters from the Navy Department to the Secretary of the Interior requesting special action on applications for patents, etc." Those for 1889 begin at the middle of that page.

Ex-Secretary TRACY. "March 2, 1889. McCarty. Improved process of manufacturing steel." I do not recollect it. "May 3, Dana Dudley, and Hotchkiss Ordnance Company. Torpedoes and launching apparatus." I think I do remember that. I remember the subject; and I think I remember too the subject of Elwell's pneumatic launching gear. I remember that such a subject was before us, and we talked about it. "November 16, Driggs." I remember he had patents. I do not remember distinctly the fact that I asked that any of his patents should be expedited.

Senator CHANDLER. You need not go over the whole list, unless you desire. You remember "Charles E. Munroe, explosive powder and gun cotton," do you not?

Ex-Secretary TRACY. No; I had forgotten that I expedited it. I knew he had a patent.

Senator CHANDLER. Very soon after the patent was granted—that is, the next spring—a contract was made for the use of the Harvey process with the Harvey Steel Company to pay them half a cent a pound?

Ex-Secretary TRACY. When was that patent granted?

Senator CHANDLER. Look on page 5 of the record in this case, under "III." There is the statement that Harvey's first patent for hardening armor plate was issued January 10, 1888. "April 1, 1891, he filed an application for a patent, on a modification of the process, which on June 11, 1891, was rejected because prior patents covered 'the well-known step of hardening by chilling.' On June 17, 1891, the application of April 1 was canceled and a new one filed. On June 20 Secretary Tracy wrote the Secretary of the Interior requesting that the application be made special in the Patent Office. The new patent was issued September 29, 1891."

Senator CHANDLER. Exactly. The net result of it was, however, that you knew at the time that whatever the Bethlehem Company had paid for the right to use those processes, it would make the Carnegie contract, if you guaranteed against any such payment under his contract, a better contract to him to that extent.

Ex-Secretary TRACY. Not at all. I assumed on the contrary, that if the Bethlehem Company were entitled under their contract with the Schneiders to have the benefit of all the processes and inventions, my indemnity of Carnegie would place him exactly on a par with the Bethlehem Company.

Senator CHANDLER. Without his paying anything?

Ex-Secretary TRACY. They did pay for it——

Senator CHANDLER. You assumed that they paid something for those processes?

Ex-Secretary TRACY. I repeat, Senator, that I did not assume that they had paid anything for the nickel patent——

Senator CHANDLER. Did you assume——

Ex-Secretary TRACY. For the nickel patent was not in existence until more than two years after the contract with the Bethlehem Company was made. It was unknown at that time. But I did assume that by virtue of general words in the contract the Bethlehem Company were entitled to all the processes and improvements and inventions which might thereafter be made by Schneider, and that they were entitled to use them without compensation.

Senator CHANDLER. Then whether or not the right to use this process had cost the Bethlehem Company anything, leaving that in a state of uncertainty, you thought it expedient to indemnify Carnegie against it?

Ex-Secretary TRACY. I did not think that what the Bethlehem Company had paid or had not paid, had anything at all to do with my contract with Carnegie.

Senator CHANDLER. You intended to make a similar contract?

Ex-Secretary TRACY. If the Bethlehem Company had paid anything and claimed that amount as an extra cost for manufacturing the nickel plate, they would have said so to me, and the fact that they did not say so to me was conclusive evidence to my mind that they had not paid anything and did not pretend that they had paid for it.

Senator CHANDLER. Why should they so say to you? They had——

Ex-Secretary TRACY. Excuse me.

Senator CHANDLER. Let me put the whole question. They had already guaranteed you against all patent processes necessary to the manufacture of the armor?

Ex-Secretary TRACY. Yes, sir.

Senator CHANDLER. And you had the right, under your contract, to require armor of a certain kind. Why, then, did you assume that if they had paid anything for this process they would have mentioned it to you?

Ex-Secretary TRACY. For this reason. Their contract was for all-steel armor. I could not compel the Bethlehem Company to make nickel armor unless they consented to it. I agreed as a condition of their making nickel armor to pay for everything that it cost them beyond the making of steel armor.

Senator CHANDLER. In what contract?

Ex-Secretary TRACY. In the arrangement that was made by which nickel steel was substituted for——

Senator CHANDLER. At a later or earlier date than the Carnegie contract?

Ex-Secretary TRACY. Long after that.

Senator CHANDLER. I am speaking of the time when you made this contract.

Ex-Secretary TRACY. I know; but that was always understood. At the time of making the contract I talked with the Bethlehem people about the contingency of requiring nickel steel of them, and whether they would do it.

Senator CHANDLER. You knew they were paying large sums to Schneider for something?

Ex-Secretary TRACY. I supposed they were paying a sum. I do not use the word "large."

Senator CHANDLER. But you assumed that they were not paying anything for this process because they never said anything to you about it?

Ex-Secretary TRACY. No——

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Secretary TRACY. No; I do not recollect it. Of course, I know I did it, for I have read that list. I do not think I recall one in the list. Let me go over that list again. [Examining.] I assumed always from the time my attention was first called to it that the policy of the Department was, that if there was any claim of a patent on file that was likely to interfere with the Government's business, the sooner the Department knew of it the better; and after the first consideration of the subject I do not know that I ever gave any attention to any special particular case. I do not recollect any.

Senator CHANDLER. Take page 46 of the record, "Abstract of letters from the Navy Department to the Secretary of the Interior requesting special action on applications for patents, etc." Those for 1889 begin at the middle of that page.

Ex-Secretary TRACY. "March 2, 1889. McCarty. Improved process of manufacturing steel." I do not recollect it. "May 3, Dana Dudley, and Hotchkiss Ordnance Company. Torpedoes and launching apparatus." I think I do remember that. I remember the subject; and I think I remember too the subject of Elwell's pneumatic launching gear. I remember that such a subject was before us, and we talked about it. "November 16, Driggs." I remember he had patents. I do not remember distinctly the fact that I asked that any of his patents should be expedited.

Senator CHANDLER. You need not go over the whole list, unless you desire. You remember "Charles E. Munroe, explosive powder and gun cotton," do you not?

Ex-Secretary TRACY. No; I had forgotten that I expedited it. I knew he had a patent.

Senator CHANDLER. Very soon after the patent was granted—that is, the next spring—a contract was made for the use of the Harvey process with the Harvey Steel Company to pay them half a cent a pound?

Ex-Secretary TRACY. When was that patent granted?

Senator CHANDLER. Look on page 5 of the record in this case, under "III." There is the statement that Harvey's first patent for hardening armor plate was issued January 10, 1888. "April 1, 1891, he filed an application for a patent, on a modification of the process, which on June 11, 1891, was rejected because prior patents covered 'the well-known step of hardening by chilling.' On June 17, 1891, the application of April 1 was canceled and a new one filed. On June 20 Secretary Tracy wrote the Secretary of the Interior requesting that the application be made special in the Patent Office. The new patent was issued September 29, 1891."

Ex-Secretary TRACY. Yes.

Senator CHANDLER. Those figures are correct. In the summer of 1892 the first contract was made by Harvey for the use of that patent. Do you remember?

Ex-Secretary TRACY. That is incorrect. The first contract was made with Harvey in 1891, before the last patent was issued.

Senator CHANDLER. Not the first written contract?

Ex-Secretary TRACY. Yes, the first written contract. It is recited in the contract of 1892, with a whereas. If you turn to it in the record you will see.

Senator HALE. Was not the Government to furnish a plant or something in that first contract?

Ex-Secretary TRACY. Certainly; that was agreed to.

The CHAIRMAN. You did that, did you not?

Ex-Secretary TRACY. We did. We agreed to defray some of the expenses of developing the patent in consideration of the Government having the right to use it for a certain sum of money.

Senator CHANDLER. Now, if you can turn to any earlier contract than that I should be glad to have you do so.

Ex-Secretary TRACY. Here in the record, at page 35, is the memorandum of an agreement made by and between the Harvey Steel Company, etc. It commences with a whereas, and the third whereas is as follows:

Whereas the said Harvey Steel Company, under date of March 3, 1891, in a communication signed by B. G. Clarke, president, H. A. Harvey, general manager, and Theo. Sturges, treasurer, agree to give the Navy Department the option of purchasing the right to use and employ the Harvey process for treating armor plates, as follows:

We hereby agree to give to the Naval Department an option for the purchase of the application of the Harvey process for treating armor plates, which was tested at the Naval Ordnance Proving Ground, Annapolis, Md., February 14, 1891—

You see this followed it in March.

on the following terms——

Senator HALE. There is no necessity for reading that.

Senator CHANDLER. It shows that there was this earlier contract.

Senator HALE. That was brought out in the other matter.

Ex-Secretary TRACY. But it seems to have escaped the attention of everybody.

Senator HALE. The original contract of 1891 did not escape my attention.

Ex-Secretary TRACY. Before incurring any considerable expense toward this Harvey business, I insisted upon the right to the process and I would have it before I would do anything. That was secured in 1891.

Senator HALE. And that memorandum, which is a part of the record shows just what the contract was?

Ex-Secretary TRACY. Yes.

Senator CHANDLER. Then, it now appears that this Harvey patent, which was originally on tool steel, came to be extended to the hardening of armor plate?

Ex-Secretary TRACY. Yes.

Senator CHANDLER. And that you made this preliminary contract, then the contract of 1892, and subsequently in April, 1893, just after you had gone out, Secretary Herbert made the second contract?

Ex-Secretary TRACY. I have heard so.

Senator CHANDLER. I want to ask you what your recollection is, the

whole of it as far as you have it, about the contracts which were made in the name of the Department for the use of the process.

Ex-Secretary TRACY. As I said, right after that experiment in February, 1891, at Annapolis, where the plates had, as we thought, demonstrated great capacity of resistance, it was considered wise to go on and pursue the development of that process. I was told that it was a patent process and that Mr. Harvey had a patent for it, and therefore I wanted to know whether if we expended money on it we would have the right to use it.

Senator CHANDLER. Who told you that?

Ex-Secretary TRACY. That it was a patent process?

Senator CHANDLER. Yes.

Ex-Secretary TRACY. Mr. Folger.

Senator CHANDLER. Your conferences were almost entirely with him?

Ex-Secretary TRACY. Well, in the beginning. But I made this contract with Harvey himself. He, with three men, came to the Department and I had an interview with them—the three officers who signed this second contract. No; that was afterwards. I think up to the time of this preliminary contract I may or may not have seen Harvey. I do not remember whether I had seen Harvey before the preliminary contract of 1891.

Senator CHANDLER. Did you have any other adviser? I am not now speaking about the adoption of the process as a useful process for armor because of the hardness it produced. I am dealing with the contract as to royalty. Did you have any other adviser on the subject than Commander Folger?

Ex-Secretary TRACY. No, I can not say that I had any other adviser.

Senator CHANDLER. Did he ever tell you that it was he who first suggested to Harvey the extension of the process from hardening tool steel to hardening armor?

Ex-Secretary TRACY. No; it was not exactly in that shape, as I remember it. I think he told me in the first interview I had with him on the subject that he had asked Harvey if it could be extended to armor, and Harvey told him yes. Then he asked him if he would apply it to a larger piece of metal, and Harvey said he would. Then we were awaiting that extension.

Senator CHANDLER. That was after the first experiment at Annapolis?

Ex-Secretary TRACY. The conversations took place before any experiments.

Senator CHANDLER. Then you went on with these experiments after you made this preliminary agreement?

Ex-Secretary TRACY. No; we went on with one experiment before we made the preliminary agreement. The trial at Annapolis was in February, 1891, and the preliminary agreement was made in March following.

Senator CHANDLER. As long as Commander Folger continued in the Department he had charge of all this business and you relied upon his judgment largely, did you not, both as to the novelty of the invention and the value of the patent?

Ex-Secretary TRACY. The question of the novelty of the patent was never suggested and never raised by anybody. I was told that it was covered by a patent process.

Senator CHANDLER. It did not occur to you?

Ex-Secretary TRACY. The thing was so novel to me that I never asked any question about it.

Senator CHANDLER. That is, the hardening of steel by burning charcoal was novel to you?

Ex-Secretary TRACY. It was.

Senator CHANDLER. Did you not know of that when you were a boy?

Ex-Secretary TRACY. No, I did not know that you could harden steel by burning charcoal.

Senator CHANDLER. You knew that you could make steel by hardening the iron by chilling it?

Ex-Secretary TRACY. I had possibly heard of it, but I am not a metallurgist. That has never been any part of my business, and I did not know about it.

Senator CHANDLER. I call your attention to the process. You now know what the process is?

Ex-Secretary TRACY. I know generally what it is.

Senator CHANDLER. Generally, what is it? The hardening of the face of armor by charcoal?

Ex-Secretary TRACY. Yes; and by subsequent treatment.

Senator CHANDLER. After you had gone on with this business in certain ways, and had gotten this contract, on June 11, 1891, the patent was rejected?

Ex-Secretary TRACY. I do not know.

Senator CHANDLER. It was rejected as covering "the well-known step of hardening by chilling." You did not know that fact?

Ex-Secretary TRACY. I did not. The first patent and the only patent I ever knew of up to the time of this application which I facilitated was the patent granted in 1888, which was in existence at the time, and to which Folger referred when I asked him if it was covered by a patent. He said yes.

Senator CHANDLER. You do not know whether the getting out of that patent was suggested by Commander Folger to Harvey or not?

Ex-Secretary TRACY. The 1888 patent?

Senator CHANDLER. Yes.

Ex-Secretary TRACY. I know nothing about it.

Senator CHANDLER. You do not know whether Folger suggested that or not?

Ex-Secretary TRACY. I had never heard of it.

Senator CHANDLER. Now, coming down to this preliminary arrangement that you made in March, 1891, it appears after you had made that preliminary arrangement and Harvey's modification of a patent was applied for, it was rejected "because prior patents covered the well-known step of hardening by chilling;" and nevertheless an amendment was then made again by Harvey of his application, you requested that it should be expedited, and then the patent was granted. The fact that the modification of his patent had been rejected on account of the well-known prior process of hardening by chilling you did not know anything about at the time, as far as you now remember?

Ex-Secretary TRACY. As far as I now remember, I never heard of it.

Senator CHANDLER. Did you know during all the year 1892 of any conferences between Commander Folger and the Harvey Steel Company in reference to his becoming employed by them?

Ex-Secretary TRACY. Never.

Senator CHANDLER. He did not tell you that there had been conferences with him on that subject?

Ex-Secretary TRACY. I never heard of his being employed by the *steel company until* after he had been granted his leave of absence.

Senator CHANDLER. How soon after that did you know it?

Ex-Secretary TRACY. I can not say, except I assume that it was before he went into their employment. He came to me and asked me if there could be any objection in my mind to his going into the employ of the Harvey Steel Company during his leave of absence; and as I supposed that all the naval officers did that and it was no part of the business of the Department to inquire what he did, I said I did not see any objection to it.

Senator CHANDLER. Now, I want you to fix the time of that conversation, if you can.

Ex-Secretary TRACY. I can not.

Senator CHANDLER. As well as you can.

Ex-Secretary TRACY. When did he go into the employ of the company?

Senator CHANDLER. I want your memory as to about the time it was.

Ex-Secretary TRACY. I can not remember it. He went out of the Department the 1st of January.

Senator CHANDLER. In 1893?

Ex-Secretary TRACY. In 1893.

Senator CHANDLER. The two prior contracts had been made, and in April, 1893, Secretary Herbert concluded the last one. With reference to his going out of the Department, January 1, 1893, do you remember when he consulted you as to whether it would be proper for him to take that step?

Ex-Secretary TRACY. It was after that sometime; but I can not tell you, because I kept no track of the date.

Senator CHANDLER. In justice to him, may you not be mistaken; might it not have been prior to January 1?

Ex-Secretary TRACY. No, sir.

Senator CHANDLER. When he came to you and said "Will it be proper for me, when I go out of the Department, to take this employment?"

Ex-Secretary TRACY. I am very sure that he never made any such suggestion to me, and I never had any information that he intended to do it until after he had tendered his resignation. He tendered his resignation about the middle of December, to take effect the 1st of January.

Senator CHANDLER. When did you say that you first knew he had any idea of going out of the Department?

Ex-Secretary TRACY. About that time was the first I had definite information of it.

Senator CHANDLER. We will take the 1st day of December. During the previous summer and fall had he ever intimated to you that he intended to go out of the Department?

Ex-Secretary TRACY. For six months or a year, I do not know how long, Commodore Folger was constantly complaining to me of ill health and insomnia and difficulties that beset him, and was saying that he wished he was rid of them, and he wished he was out of the Department. We had friction sometimes, and I have heard him make such a declaration at those times. But he never announced his intention to retire until about the time he tendered his resignation. That is the first that I ever had any definite knowledge that he intended to retire.

The CHAIRMAN. From your intercourse with him did you consider him an ill man during that period previous to his retirement?

Ex-Secretary TRACY. I did.

Senator CHANDLER. What was the matter with him?

Ex-Secretary TRACY. Insomnia and nervousness.

Senator CHANDLER. Do you know his condition now?

Ex-Secretary TRACY. I do not know. I have seen him but twice since the spring of 1893.

Senator CHANDLER. You define his trouble as insomnia and nervousness?

Ex-Secretary TRACY. I take his word for it and his experience and action.

Senator CHANDLER. Do you call that a disease?

Ex-Secretary TRACY. I do. I know he used to come into the Department frequently and say, "I did not sleep two hours last night;" that he had been worrying about something on his mind that was annoying him.

Senator CHANDLER. You do not think that during all that period when he laid awake nights he had any understanding with the Harvey Steel Company to go into their employment when he went out of the Department?

Ex-Secretary TRACY. I do not believe he had. I do not believe for a moment that he had.

Senator CHANDLER. Having gone over this point in this way again, please state what your present recollection is as to when you first had knowledge that he meditated going into the employment of the Harvey Steel Company?

Ex-Secretary TRACY. My general recollection is that it was after he retired. If I was told positively that it was after he tendered his resignation and before the 1st of January, I could not positively, of my own recollection, deny it. I know it was after he tendered his resignation. My best recollection is that it was after the 1st of January and after he was out of the Department, and that I had never heard of it up to that time.

Senator CHANDLER. And as far as you could do so orally, you assented to the propriety of it?

Ex-Secretary TRACY. I said I knew no objection to his going into the employment of the Harvey Company if he chose to do it.

Senator CHANDLER. Do you know anything about the contracts made by the Harvey Company for the use of their processes abroad?

Ex-Secretary TRACY. Nothing except what I have heard.

Senator CHANDLER. You have heard that they have contracts with foreign governments?

Ex-Secretary TRACY. They have very extensive ones, very large ones, and very profitable ones.

Senator CHANDLER. Mr. Chairman, I have no further questions to ask Mr. Tracy.

Senator HALE. Let me ask generally, facing these conditions as you have and these contracts that were made, do you see anything now that leads you to say that if you were going over this road again you would not take the same course?

Ex-Secretary TRACY. I say no, most emphatically; but I should be only too happy to take a similar course in another direction that would confer equal benefit upon the Government.

Senator CHANDLER (to Senator Hale). How broad do you make that question?

Senator HALE. As to the contracts that were made and the course that General Tracy pursued, as he has outlined it to us.

Senator PERKINS. While Secretary of the Navy?

Senator HALE. While Secretary of the Navy.

Senator CHANDLER. Do you mean to include his opinion as to the *propriety of Commander* Folger taking employment with the Harvey *Steel Company?*

Senator PERKINS (to ex-Secretary Tracy). You refer only to your own action, I understand?

Ex-Secretary TRACY. The question called for my action.

PROPOSED ARMOR-PLATE FACTORY.

Joseph Wharton, R.W. Davenport, John Fritz, and George H. Myers, representatives of the Bethlehem Iron Company, and Andrew Carnegie, Millard Hunsicker, and Lieut. C. A. Stone, United States Navy, retired, representatives of the Carnegie Steel Company, appeared.

The CHAIRMAN. Gentlemen, you are aware that some time since a bill (S. 1700) to provide for the erection of an armor-plate factory in the city of Washington, D. C., was introduced in the Senate by Mr. Smith, of New Jersey. As you are practical men, engaged in this business, the committee desire to get your views as to the cost of the erection of such an armor-plate factory. Mr. Wharton will be kind enough to make a statement to the committee as to the cost of the plant at Bethlehem, stating in addition to its original cost the cost for the purpose of manufacturing armor plate.

Senator SMITH. And the quantity of armor plate it will produce.

The CHAIRMAN. Yes; and the capacity of the plant.

STATEMENT OF JOSEPH WHARTON.

Mr. WHARTON. In our establishment at Bethlehem we have one account for all that part of the work which is devoted to the Government service. It does not include any part at all of the original plant, but only the part devoted particularly and exclusively to the Government service. The cost comes to almost exactly $6,000,000. That includes something else besides the armor plate, because we make gun forgings and finished guns. I do not suppose that you care for the details, and I do not know that we ought to tell the details, because something like trade secrets is involved in this question.

The CHAIRMAN. No; I do not think we ought to ask you as to the details.

Mr. WHARTON. I do not think that you need more than a general statement.

The CHAIRMAN. Do I understand you to say that you could establish a plant capable of doing the work which you are now doing for the Government for the sum of $6,000,000, or is it in addition to your original plant that the $6,000,000 was expended?

Mr. WHARTON. It is in addition to our original plant.

The CHAIRMAN. Was the original plant in any way essential to this work?

Mr. WHARTON. Only in this way: By having the original plant there we were able to do a great deal of construction work much cheaper than any other person could get it done for. We have no manufacturing profit to pay on the construction of a great deal of our apparatus and our buildings.

The CHAIRMAN. And it is charged up in your account simply at the actual cost?

Mr. WHARTON. Simply at actual cost.

The CHAIRMAN. You did not give your establishment any credit of profit in that respect?

Mr. WHARTON. Not at all. It could not be repeated, therefore, by any other party that did not have the same facilities at the sum which

it cost us. I do not know what that manufacturing profit would be. We never made an estimate, but it would be a very handsome sum. Neither do we reckon any interest, but simply the absolute cash paid out.

The CHAIRMAN. Do you think it would cost the Government to-day that amount of money to build a plant here equal in capacity to yours?

Mr. WHARTON. It would cost the Government more than that.

The CHAIRMAN. Why?

Mr. WHARTON. Because the Government would have to pay somebody a manufacturing profit for things which we put in without any profit. Then, there is no transportation charge. We made the things right on the spot and did not have any freight to pay.

The CHAIRMAN. But are not all prices much less now than they were then?

Mr. WHARTON. No; we did not go into the period of high prices. Starting with pig iron, for instance, we made the pig iron and from it made our own muck bars and from that the needful structural forms.

The CHAIRMAN. What did your pig iron cost you at the time you built your establishment?

Mr. WHARTON. I do not remember, and can not tell accurately

The CHAIRMAN. You can tell about the cost?

Mr. WHARTON. I suppose approximately $15 a ton.

The CHAIRMAN. What is the cost to-day?

Mr. WHARTON. That depends on the quality of it. I suppose the same iron would be a dollar or two cheaper. Mr. Carnegie can answer that question better than I can.

Mr. CARNEGIE. I think you are just about right, but as to the amount of pig iron that enters into the construction of an armor plant, I do not think there are 2,000 tons.

Mr. WHARTON. It is not very great, but there is much work put upon it afterwards. We were able to make these things from the pig iron up; but the cost of pig iron, as Mr. Carnegie said, is not the controlling item. The labor and the collateral expenses of all sorts are, I think, just the same now as they were then.

Senator PERKINS. What is the capacity a month of your plant?

Mr. WHARTON. I suppose we could make about 400, 500, or possibly 600 tons a month.

Senator HALE. Have you ever done that?

Mr. WHARTON. I would rather ask Mr. Davenport as to what the capacity is.

Senator HALE. Before you come to that let me ask if you have ever turned out, of Government armor plate, under contract from the Government, 500 tons a month?

Mr. WHARTON. Mr. Davenport is vice-president of the Bethlehem Iron Company and has charge of this branch, and therefore is better able than I to answer technical questions of this sort.

Mr. DAVENPORT. We have shipped a great deal more than that, but the manufacture spreads over such a great length of time that it is hard to state when it was commenced and when completed.

Senator HALE. Do you think you have ever turned out in your establishment more than 300 tons in any one month?

Mr. WHARTON. Do you mean manufactured from the beginning?

Senator HALE. Manufactured armor plate for the Government in one month. I do not ask what you have shipped. You may have shipped it all in one month, but I ask as to your actual product of finished armor plate for the Government?

Mr. WHARTON. We have forged a great deal more than that.

Senator HALE. I do not mean that, but turned out completed?

Mr. WHARTON. We have gone through one operation——

Senator HALE. I mean turned out completed in any one month. Have you turned out completed more than 300 tons in one month?

Mr. DAVENPORT. That is an extremely difficult question to answer directly in that way, because the manufacture spreads over such a length of time.

Senator BACON. Let me ask a question, if you will pardon me. Take as long a term as six months. Have you ever made an average of the amount turned out in that time?

Mr. CARNEGIE. That is it. Take a year. About 3,000 tons.

Mr. DAVENPORT. As it stands now it would be from 3,000 to 3,600 tons a year. That is hard-finished armor. But, of course, in certain operations they furnish more than that quantity.

Senator PERKINS. Working continuously during the year you have turned out only from 2,500 to 3,000 tons?

Senator HALE. Your capacity is about from 3,000 to 3,500 tons a year?

Mr. DAVENPORT. Yes; of hard-faced armor.

Mr. WHARTON. We have had some discussion lately in the board as to what could be done in taking contracts, and we have surely had a higher estimate than that of what we could do. I think on our estimate we could make 5,000 tons a year; 500 tons, possibly, a month. Am I mistaken in that?

Mr. DAVENPORT. We are not prepared to do that now with hard-faced armor, but the plant could be brought up to that.

Mr. WHARTON. There are so many processes in this thing, from one end to the other. It is not like putting a piece of wire in a pin machine and having it turned out a finished pin in a second, but there is one process following another. It is an old saying that a chain is no stronger than the weakest link, so that the quantity of armor plate now turned out is limited by the capacity of the weakest part of the plant. But when we were lately looking into the question as to what we could do, we took up the question as to what we could do if this weakest part were strengthened so as to bring the capacity of the whole plant up to the full capacity of its ablest parts.

My recollection of that is, and I now ask Mr. Davenport's confirmation or correction, that we thought we could go to 500 tons a month with those improvements on what I have called the weak parts. The Harveying, as it is called, or the casehardening of armor is a very tedious business, and we have never been called upon to do more than a certain quantity of it. We have to begin with a choice of the iron, for it is a very critical matter to have exactly the right kind of iron. We make that iron to a great extent ourselves. Then follow the melting of the iron or of the mixture of irons, the conversion into steel, the casting of the ingot, the forging of the ingot, the rough shaping it under the hammer, the machining it, cutting it to exactly the right shape, and finally the tempering and the casehardening. You will see that a weak place limits the whole thing, and you will understand how by strengthening those weak places we can bring the works to their full capacity.

Senator HALE. As iron is constantly in demand, and these are not expensive, but general additions, why have you not already put your plant in a condition where you could turn out more than 3,000 tons in a year?

Mr. WHARTON. There has been no greater demand. Since the fashion of casehardening the armor has begun we have been able to do what we were required to do.

Senator HALE. You are not required now to furnish anything but that kind of armor?

Mr. WHARTON. I presume all the armor hereafter will be casehardened.

Senator HALE. What is called harveyizing?

Mr. WHARTON. Yes; harveyizing, which is an unsuitable term for casehardening, has long been applied to many objects, and casehardening of armor was first done by our company, the Bethlehem Iron Company.

Senator HALE. You state that about $6,000,000 was the cost of the addition to your plant for Government work?

Mr. WHARTON. Yes.

Senator HALE. How much of that was made necessary, not by your gun plant, your ordnance contracts, which we are not dealing with, but by the armor plate?

Mr. WHARTON. For the armor plate, about two-thirds of the whole.

Senator HALE. About $4,000,000?

Mr. WHARTON. About $4,000,000.

Senator HALE. You are entirely confident that in addition to all that you added for any work, you have put $4,000,000 into the increase of plant to produce this armor plate?

Mr. WHARTON. Yes.

Senator HALE. How much of that could be properly charged to experiments and processes that you have attempted in the way of hammers which you have found to be useless and which, if you were to do it now, you would not repeat?

Mr. WHARTON. The hammer is the only thing of that nature, and we are not sure that that is useless. We have found, for instance, that to make a plate partly under the hammer and partly under the press is a very effective way of making a first-rate plate. It is a double process.

Senator HALE. If you were now, in the light of your experience, to begin again, would you spend the same amount of money upon the hammer that you did?

Mr. WHARTON. I doubt whether we should. I doubt whether we should put up a hammer at all.

Senator HALE. What was the cost of the hammer?

Mr. WHARTON. Something over $400,000. Let me say at this point—there is a good deal said about reforging nowadays—the reforging we can do with very good effect by one forging under the hammer and one under the press; thus in case of a large demand we would use both the hammer and the forging press.

Senator HALE. Is the reforging the Corey patent?

Mr. CARNEGIE. It is our own patent.

The CHAIRMAN. There was no other establishment of the kind in the country when you made your first contract with the Government?

Mr. WHARTON. There was not. The Government was in urgent need of such an establishment, and we were appealed to to undertake it. At that time there was no method of making these plates except under the hammer. There was no other process of making such plates anywhere.

The CHAIRMAN. Did the proposition come from the Government or from your company to enter into this business?

Mr. WHARTON. It came from the Government.

Senator HALE. Are you in a condition, or have you been for the last two or three years, of active and earnest and bona fide competition with the Carnegie Company?

Mr. WHARTON. Well, we are in such competition with them that every time there is an invitation for bids—well, I do not want to say anything that would hurt my friend Carnegie's feelings. However, there is about as much jealousy between the two companies, I think, as is wholesome.

Senator HALE. Do you have the benefit of any processes or inventions that come from the Carnegie establishment or any person connected with them?

Mr. WHARTON. No; we do not.

Senator CHANDLER. What was said about the Corey patent, which was referred to as I came into the room?

Senator HALE. Mr. Wharton was speaking of reforging and I asked him if it was done under the Corey patent.

Mr. WHARTON. We do our reforging not under any Corey patent or anybody else's patent; when needful we do it ourselves in our own way.

Senator HALE. Has any interference been attempted with you by the owners of the Corey patent in the nature of complaint for infringement?

Mr. WHARTON. Not that I have heard of. How is that, Mr. Davenport?

Mr. DAVENPORT. None.

Mr. WHARTON. I have never heard of any.

Senator HALE. Mr. Wharton has just stated, when I asked if his company had any rights granted from Carnegie, that there were none. You have no arrangement of that kind, I understand?

Mr. WHARTON. We have no arrangement, and I never heard of any attempt to prevent us from using a patent of theirs. Mr. Davenport, to whom I refer for confirmation, also has not heard of any.

Senator HALE. You are not permitted by any contract or agreement or understanding with the Carnegie Works to have the benefit of any of their processes or their inventions whatever?

Mr. WHARTON. Not that I know of.

Senator HALE. If such is the fact it is unknown to you?

Mr. WHARTON. Yes. At the same time I will say that if Carnegie had anything that we did not have we would try to get up to him.

Senator HALE. Have there been any bids put in by either concern in the last three years upon which contracts have been awarded in which the bids of the other company were larger?

Mr. WHARTON. I do not think I catch your meaning, sir.

Senator HALE. Has there been any case of competition where either concern has secured a contract because it bid lower than the other?

Mr. WHARTON. I suppose that has been the case every time?

Senator SMITH. To bid on armor plate, of course, Mr. Hale is referring?

Mr. WHARTON. On armor plate. As to that also I refer to Mr. Davenport. It is in his line more than in mine. I am simply a stockholder and director in the company, and I do not take an active part in the daily conduct of the business.

Senator HALE. What are you receiving now in that company per ton for armor plate furnished the Government?

Mr. WHARTON. On that point, again, I would rather you would ask Mr. Davenport. I do not keep those figures in mind.

Senator HALE. You understand that it is the same the Carnegie Company are receiving for theirs?

Mr. WHARTON. That, again, I do not know; but Mr. Davenport, I think, does. I know that the prices can not have been very widely different at any time between us and Carnegies. There is a kind of general price for these things all over the world, and we know in a general way what all our competitors in this and other countries are doing. The market price, you may call it, of armor plate is something like the market price of wheat. It is the market price here and the market price there, and it is known to people who are in that business, and they make their prices accordingly.

Senator HALE. Not having knowledge of the details, you have a pretty good knowledge, I take it, of the financial condition of the Bethlehem establishment, have you not?

Mr. WHARTON. Yes; I hope so.

Senator HALE. You know whether it is making money or losing money, from time to time?

Mr. WHARTON. Yes.

Senator HALE. You speak of these contracts as being naturally about alike because there is a fixed rate?

Mr. WHARTON. No; I do not say a fixed rate. That conveys another idea.

Senator HALE. I do not mean a fixed rate, but a general rate.

Mr. WHARTON. There is a general rate, what may be called the market price, for such things as armor plate.

Senator HALE. Do you know, representing the financial management of this concern, the profit upon each ton of armor plate that is furnished to the Government?

Mr. WHARTON. No, I do not know. If I did I do not think I would tell you. I think that is something you have no right to expect me to tell.

Senator CHANDLER. You were not asked how much is the profit.

Senator HALE. I did not ask how much, but I asked if you know.

Mr. WHARTON. I know approximately, but I do not know accurately. I know, for instance, that we make certain dividends. A part of my business as one of the directors at the sittings of the board is to settle upon the dividends.

Senator HALE. The dividends are public. It is well known what your dividends are?

Mr. WHARTON. Of course the dividends are well known to the stockholders, but not known to the public generally. However, there is no particular objection that I am aware of to having the dividends known.

The CHAIRMAN. How do the prices of armor plate in this country compare with the prices in England and Germany?

Mr. WHARTON. They are almost exactly the same.

Senator HALE. Made by private establishments?

Mr. WHARTON. Yes. I will not say they are exactly the same, for they are not, but they are approximately the same. In entering into this business we had to meet what was the uniformly established price abroad. That price was well known to the Government and to ourselves, and if we could go into the business on about those terms the Government would like very well to have us go in.

The CHAIRMAN. You are speaking of the original contracts?

Mr. WHARTON. Of the original contracts, which I think are not yet entirely fulfilled.

The CHAIRMAN. The original contracts that were made between the Government and Bethlehem were based on the prices then existing abroad?

Mr. WHARTON. Yes, sir; they were.

The CHAIRMAN. And no additional price?

Mr. WHARTON. I think the price was about as much more than the foreign price as the freight would amount to.

The CHAIRMAN. Is that all?

Mr. WHARTON. Again I would ask Mr. Davenport's view on that point.

Senator HALE. Did you not understand when these first contracts were made that they were made very liberal because you had to run the risk of creating a plant, and run the risk of not getting continuous work, owing to the failure of appropriations? Did you not understand that by reason of that you, rather naturally, got an exceedingly good contract?

Mr. WHARTON. The contract was not exceedingly good. It was a contract that nobody else in America would take. There was no other establishment in America that would venture to do the thing which we did.

As I said a while ago, we did that, not because we wished to do it, but because the Government besought us to do it. We planted our money there. We did not in the beginning get any profit at all, and the company was reduced to considerable embarrassment, and if it had not been for strong backers it would have broken down. But it had strong backers and did not break down. It was carried through and has paid dividends, I think, for the last three years; and if you care to know I will tell you what those dividends are.

The CHAIRMAN. I do not think that is necessary.

Mr. WHARTON. It is not necessary, and it is not strictly in the line of the investigation, but I have no disposition to conceal that from you.

Senator SMITH. I do not think we want that.

The CHAIRMAN. What we want, and all we want to ascertain, is the probable cost of erecting a plant here.

Mr. WHARTON. It will cost the Government more than it cost us. You could not expect to get a plant put up without having to pay the contractors' profits, and the manufacturers' profits, and dear knows what. Government work always costs more than private work.

Senator HALE. If this part of it cost you $4,000,000, what would you say would be the cost in this case, taking into consideration the fact that the Government must build under the eight-hour system, which you have not in your establishment?

Mr. WHARTON. No; we have not.

Senator HALE. The Government has. Taking all things into consideration, if it cost you $4,000,000, what do you think it would cost the Government to put up a plant that would furnish 300 tons a month, and, by small additions, 500 tons a month?

Mr. WHARTON. The Government would have to expend considerably more than we did. I think it is germane to the subject to say here that we have a remarkably good class of labor around us at Bethlehem. We have what are usually called the Pennsylvania Dutch—sturdy, patient, toiling men, trained to work in iron, and both diligent and faithful. The Government could not expect, and it would be quite impossible, in my judgment, for the Government to get, as much work in the same number of hours, independent of the difference between ten hours a day and eight hours a day, out of any people whom it would employ, as we get out of the people we employ. That is an element of additional cost to the Government.

Senator HALE. You do not think that the Government would get, in eight hours, as much work as you would get in eight hours?

Mr. WHARTON. I feel sure it would not.

Senator CHANDLER. That is, in the running department?

Mr. WHARTON. No; in the construction and also in the running.

Senator SMITH. Is most of your work done by day work or by piece work?

Mr. WHARTON. The most of it by day work.

Senator HALE. How many men have you in your employ now?

Mr. WHARTON. I will ask Mr. Davenport to state the numb[illegible]

Mr. DAVENPORT. Considerably more than 4,000 in the whole [illegible].

Senator HALE. What do you think is generally the proportion of your work going on now, of ironwork and other work?

Mr. WHARTON. Do you mean in money or in pounds?

Senator HALE. The general product; the value of the product?

Mr. WHARTON. That is constantly varying. Sometimes we are doing Government work and sometimes not. Sometimes we have good railroad orders for rails and sometimes not. I suppose, taking the years through——

Senator HALE. Taking it year by year?

Mr. WHARTON. If that is an important question, I would rather answer it after getting the statistics. I am afraid that I could not do much better than make a reasonably good guess at that.

Senator HALE. It only goes to show the extent of the general business there, and bears somewhat upon the cost.

Mr. WHARTON. As I said, I can get that with some accuracy if you think it is desirable.

Senator HALE. No, I do not think it is important.

Mr. WHARTON. I am a little afraid to make an estimate.

Senator HALE. Do you think you are doing as much work outside as you are doing for the Government?

Mr. WHARTON. In the normal condition of things I suppose our output of tonnage would be ten times as much, or it may be twenty times as much, for private parties as for the Government.

Senator HALE. But in valuation?

Mr. WHARTON. Again I come to a point where really I do not like to make a crude guess. It would be a discredit to me if I came far wrong in a business I ought to know about, and a guess would not do you any good.

Senator HALE. The armor is a thin product; it does not take up as much bulk and weight as a good deal of other work.

Senator PERKINS. I should like to ask a hypothetical question which suggests itself to me as a principal question for this committee to consider. Of course you are not obliged to answer it unless you feel at liberty to do so. If the Government should deem it expedient to erect a plant costing, as you have stated, not less than $4,000,000, that is capable of turning out 4,000 tons of armor plate per annum, do you believe that private corporations like your own would compete with the Government for the construction of armor plate? Would they take it for 25 per cent less than the Government is now paying?

Mr. WHARTON. No; I think not. I think the Government is the best competitor we could possibly have. We could beat the Government more easily than we could beat any private competitor.

Senator HALE. In other words, the Government could not furnish it as cheaply as you could, you think?

Senator PERKINS. That is not the idea.

Mr. WHARTON. I get your idea, I think. It is whether we could reduce our profit enough to furnish our plates 25 per cent cheaper.

Senator PERKINS. It has worked that way, you know, upon the building of the battle ships. I am from the Pacific Coast, and familiar with the work you are doing for our concern there. You are familiar, of course, with the fact that we have given the contract for building the last two battle ships at fully 20 per cent less than the Government paid for the work two years ago. Owing to the fact that private competitors were competing for the construction of these ships, the Government had the advantage of it by the last bid from the Newport News Company.

Senator HALE. It brought the price down?

Senator PERKINS. It brought the price down.

Mr. WHARTON. If I may be allowed to throw a little side light on that transaction, I can do so. I happen to know, because I had a conversation with Mr. Huntington, that the Newport News people were quite determined to get this business. I had occasion to offer to the Newport News establishment the building of a ship that was wanted in a foreign country. One of our agents in that part of the world had an opportunity given to him to take the contract if he would take it at a certain price, the price, I believe, at which they could get the ship for in England. I had occasion to speak to the Newport News people about that, and it was obvious that they were hungry for work, and were determined to get into that kind of work, that is, the building of steel steamships. I believe that the contract which Mr. Huntington has taken is going to be a pretty difficult one to fill.

Senator PERKINS. That is interesting to the naval committee, because we are considering the question in connection with matters before the committee, but the point I wish to bring out is this: If the Government had this plant, and never used it, would it be a good investment for the Government by stimulating competition among your own good company, Mr. Carnegie's, and perhaps others, who might undertake the making of armor plate?

Mr. WHARTON. I may say in the first place that the other parties of whom you speak will never go into the business. There is not business enough at present or apparent to justify the existence of even two plants. No private competitor will rise, therefore. If the Government should compete by setting up a plant, I think human nature is such that the establishments now existing would try to see that they were not going to be injured by the construction of the Government plant.

I think that Mr. Carnegie and somebody up at Bethlehem might begin to compare notes and see how to prevent what I might almost call plunder. We have put a vast amount of money into this business to do Government work. If the Government deliberately should turn around and deprive us of the work after we have spent our money and our time, or should attempt to do so, it would then be in order, in my judgment, to see how we could get even with the Government. I do not think it would work to the Government's advantage in that respect.

Senator PERKINS. That is a question which we, as your representatives, are going to consider at this time.

It has been stated that there must be a very handsome margin of profit in the manufacture of armor plate from the fact that you first demanded almost enough, so it has been charged, for the construction of your plant to leave your first contract with the Government a profit. That, of course, in a measure is corroborated, if the reports are true, that you have taken contracts for foreign Governments to manufacture

the same armor plate for less than $300 a ton that our Government has been paying you $500 a ton for.

Mr. WHARTON. On that point I will say that seeking for a contract in Russia was largely my individual act. Our company had an agent in Europe, and I recommended to our people that he should be sent to Russia to see what business was in existence or in prospect there. He went there. He is Lieutenant Meigs, formerly of the Navy. He found that there was nothing then wanted by the Russian Government. But he showed such sufficient evidence of our capacity to make armor plates here that he received from the Russian Government the assurance that when they next needed armor plates the Bethlehem Company should be invited to bid for those armor plates.

The time came within a year when they did want some armor plates. We were invited to bid, and we sent Meigs there to investigate, and to represent us. We told him to take the work. It was not a question whether we were going to make money or lose money; we were to get the work. All Europe was there competing against us.

The impression had spread through Europe, carefully inculcated by the European armor-plate makers, that nobody knew how to make armor plate except the few over there; that America was not of any account in trying to make armor plate; that it did not know how. We simply were determined to break up that prejudice and that notion. We took that order without any regard to its cost. We no doubt will lose money by it, but we do not care if we do. We were determined to do it.

Now, what is the effect of that action? Before that was done I do not think that there was anybody in the marine department of any of the European Governments who had much respect for American armor plate or American ships armored with American armor plate. They poohpoohed the whole thing. It was an untried thing; an unknown quantity. But after we had made those plates, and after they had undergone the very rigid inspection and trial of a ballistic test, to which the Russian Government subjected those plates, it was then perfectly apparent that our plates were quite as good as, and I feel certain they were better than, any made in Europe.

That fact being established, led to the Government of Russia giving to American establishments, both to ourselves and to Carnegie, other contracts for making armor plate for Russian ships. The net result of the whole business is that while we at Bethlehem lose a little money the American Navy has now the prestige of having armor plate that is absolutely good. The moral advantage gained by the American Navy through that little exploit of ours is something that you can hardly calculate.

The CHAIRMAN. Do I understand you to say that since the original contract with the Russian Government at the low price additional contracts have been awarded to our manufacturers?

Mr. WHARTON. Yes.

Senator CHANDLER. At the same rate or at a higher rate?

Mr. WHARTON. It is about double. They have made the new contract at just about what I called a while ago the market price.

Senator HALE. About the same prices that you get here?

Mr. WHARTON. Just about the same prices that our Government is paying. I can not tell within a dollar or so a ton.

The CHAIRMAN. That is immaterial, but it is about the same?

Mr. WHARTON. The price is just about the same that our Government *is paying.* The Russian Government did not hesitate to pay what I

again call the market price for American armor so soon as it was convinced that the American armor was as good as any it could get anywhere else.

The CHAIRMAN. Until the Russian Government were convinced of that fact, you had to take the contract at a lower price?

Mr. WHARTON. Yes, sir. We were determined to break in.

Senator HALE. Do you remember whether you were bid down to that very low price or whether you were way below other bidders?

Mr. WHARTON. We were the lowest bidders, but the other manufacturers, the European manufacturers, were as determined to keep us out as we were determined to get in, and there was a remarkably lively time there for some weeks.

Senator HALE. The foreigners chased you on the bids as long as they could?

Mr. WHARTON. They did.

Senator PERKINS. Do the Governments of England and France manufacture their own armor plates?

Mr. WHARTON. They do.

Mr. CARNEGIE. Oh, no; not at all. The countries do.

Mr. WHARTON. I misunderstood the Senator. The Governments do not. I took the word "government" in the sense of country.

Senator PERKINS. I mean the Governments of those countries?

Mr. WHARTON. None of the governments do any such thing.

Senator PERKINS. Does Germany manufacture her own armor plate? There is the Krupp Company in that country.

Mr. WHARTON. No; there is no government armor-plate establishment in the world.

Senator PERKINS. There is not?

Mr. WHARTON. No.

Senator PERKINS. Neither England nor any other government has a governmental armor-plate establishment?

Mr. WHARTON. No. Is not that so, Mr. Davenport?

Mr. DAVENPORT. The only possible exception is Italy, where the Government for a time aided with capital an armor-plate establishment.

The CHAIRMAN. If we attempted it, it would be an experiment?

Mr. WHARTON. Yes; an experiment which has been condemned by every other country.

I wish to say one thing more. You have asked me about the cost of the plant. You have not asked me about another additional item which is just as necessary as the ground, or the hammer, or the press, or the furnace, or anything else. That is the working capital. If you build an establishment, spending four or five or six million dollars, whatever it may be, you then will have to invest I should say from $2,000,000 to $3,000,000 in working capital.

The process is very tedious. You have to have the choicest material in the beginning. It has to be worked with extreme care, without haste. At all stages you have to have a great quantity of stuff in process. Compared with your final output, if you are going to make 3,000 tons a year, you will have to have nearly so much stuff probably in the works at different stages. At one time I think we have had as much as two millions and a half, at least, of stuff in process.

The CHAIRMAN. Material on hand?

Mr. WHARTON. Working capital, in other words.

Senator HALE. And that is not reckoned in the $4,000,000?

Mr. WHARTON. No.

The CHAIRMAN. That is in addition.

Mr. CARNEGIE. You have not spoken of the half million dollars paid to Creusot.

Mr. WHARTON. Mr. Carnegie reminds me that we paid a half million dollars to Creusot. It was almost made a condition by Secretary Whitney. The whole business was such a formidable task that nobody in this country was ready to believe it could be accomplished. I went myself to France in 1885, with the knowledge and approbation of the Navy Department, to endeavor to make an arrangement by which we at Bethlehem would come into possession of all the information and experience that Creusot had acquired, the Cruesot establishment being the leading one in the world and making far better armor than anybody else. That resulted in our being obliged to make a deal with them, which cost us, I think it was, exactly a half million dollars.

The CHAIRMAN. To what company was that paid?

Mr. WHARTON. A company called Le Creusot (Schneider & Co.), at Creusot.

Senator CHANDLER. The firm we have been talking about?

Mr. WHARTON. I think Mr. Chandler was aware of that at the time.

Senator CHANDLER. I thought I was, but Mr. Tracy convinced me that I did not know anything about it.

Ex-Secretary TRACY. Oh, no. I said you were under contract with them. The question arose between Senator Chandler and myself whether the price was at all increased by the use of the nickel process that was invented in 1889, two years after the contract was made.

Mr. WHARTON. No, sir; it was not.

Ex-Secretary TRACY. That is what I supposed.

Mr. WHARTON. I am glad you mentioned the nickel patent, because when I was in France, at the time I speak of, I was invited, as an expert in nickel (and here I must mention the fact, because all the gentlemen may not know it, that I am the original nickel maker of America, and have been in the business for many years), by the great French company called Le Nickel, to investigate some inventions which had been made by a man named Henry Marbeau, who was one of Le Nickel Company, Harry Marbeau, as they called him there.

He had been investigating as to the properties which would be acquired by iron and steel if alloyed with nickel. Le Nickel Company were not inclined to believe that there was anything in it, but one of them asked me if I would not spend an hour with Marbeau and look into the matter, which I did. Marbeau in a very emphatic French way explained these things to me with some vehemence and gesture, calling me occasionally "mon maitre," calling me his master as knowing more about nickel, he thought, than he did.

The whole thing was put before me in that way, and I soon after mentioned to Schneider & Co. that there was a thing which they could not afford to be debarred from. I believed from what I saw then that nickel was going to come into use as an element of armor plate, and I thought they, as the principal armor makers of the world, making the best armor plate, could not afford to be debarred by a patent from the use of nickel for armor plate. My impression is that up to that time Schneider & Co. had not thought of making nickel-steel armor plates. Afterwards the same concern undertook to take out a patent for themselves, as if they had invented it.

Senator SMITH. Who took out the patent? You say "they" took it out.

Mr. WHARTON. I think one of the Schneiders took out the patent.

Senator CHANDLER. After your conversation with him?

Mr. WHARTON. Certainly. People do not always remember perhaps where they get a hint from. I do not claim anything from it.

Senator CHANDLER. Do you think you communicated a patentable invention to him in the conversation you speak of?

Mr. WHARTON. No; I doubt whether the whole idea of alloying nickel with steel was patentable. It had been done and tried by several people. I afterwards had occasion to investigate the matter, and I was surprised at the number of people who had done it.

Senator CHANDLER. What did you pay the half million dollars for?

Mr. WHARTON. For their alleged superiority in the way of making armor plates. It was not supposed that we would succeed in this formidable task unless we started on the foundation of all the best knowledge that the world up to that time possessed; and that knowledge was concentrated, it was supposed, in the hands of the Creusot Company.

Senator CHANDLER. How did Carnegie & Co. get it?

Mr. WHARTON. The thing was comparatively open. We had been at it for some years and there was no patent about it at all. I do not think that what we got from Creusot was necessary to us.

Senator CHANDLER. Did Mr. Carnegie, when he was starting his plant, have access to your plant for the purpose of seeing how the armor was made?

Mr. WHARTON. He might have come to it if he wished to, but in point of fact he did not. The Government inspectors were thoroughly acquainted with everything we did, and those inspectors were able to carry information to any extent they liked.

I do not know whether it would be interesting to you, but I am disposed to say one more thing in regard to armor plate to show you our improvements. When we started in this business there was a question as to whether solid armor of homogeneous steel, or compound armor, namely, a soft iron backing with a steel facing, was the better. That question was an open one. Nobody was able to give an authoritative opinion upon it. I looked into it. When I was in England asking opinions, among other persons I asked of Sir Thomas Brassey, since Lord Brassey, but he did not know, or would not tell. What this country did—and it is worth while for you to consider this—was to settle that question. I think you (to ex-Secretary Tracy) had some experiments made at Indian Head.

Ex-Secretary TRACY. I beg pardon; I did not hear the statement.

Mr. WHARTON. Did you not have some experiments made at Indian Head with compound armor, nickel-steel armor, and plain steel armor?

Ex-Secretary TRACY. The experiments were at Annapolis.

Mr. WHARTON. Up to that moment the battle had not been fought out, and it was an open question which was the better style of armor. There was nobody in Europe who could give an authoritative opinion. The Creusot people said theirs was the best. It was the best, but before demonstration their opinion had to be taken as possibly an interested opinion, because they were the only makers of that kind of armor plate at that time. The English would not tell if they knew, because their ships were armored to a great extent with compound armor. If compound armor was a humbug and would not stand the impact of shot, then a great portion of their fleet was useless against modern guns. So they would not tell, or they could not.

But when our own Government made those experiments, then there was an absolute fact, and it turned out that we had taken the proper course. *We had not* meddled with compound armor from the beginning,

but we had taken what was apparently the best course, namely, to go to headquarters, to the people who made the best armor, and get from them everything they knew.

All those things the Government would not have to do over again, because the art is now established in this country; but the Government could not escape paying the full value of an armor-plate plant; they could not build that armor-plate plant so cheaply as we could or did; they could not escape having the working capital to run the business; they could not, after they had got the plant, make plates as good as ours, and that, I say (and I think perhaps you will bear me out in the statement), is almost the inevitable consequence of the Government trying to do things without the kind of sharp scrutiny which private persons have to submit to. We have inspectors in our place, and any kind of a blemish is detected; but if you had a Government establishment I do not think you would get the same kind of sharp inspection. I think plates would pass through a Government establishment that would not pass through the Bethlehem Company's or Carnegie's.

Senator SMITH. Were you familiar with or were you connected directly with the making of the contract with the Bethlehem Company for furnishing armor plate at the time it was made?

Mr. WHARTON. For the United States Government?

Senator SMITH. Yes, sir; made with Mr. Whitney.

Mr. WHARTON. I was not; because I told Mr. Whitney that when it got to that point "my function is done; I am going to retire. I will not come down to attend the opening of bids. I will not take any more part; you will not see me any more. The matter is in the hands of the Bethlehem Company."

Senator SMITH. Up to that point you were in communication with Mr. Whitney and talked with him on the subject?

Mr. WHARTON. I was in communication with him on several occasions; not exactly frequently, but on several occasions, and with a good deal of closeness.

Senator SMITH. Was there ever any question, or did you have any understanding, either implied or expressed, that after the contract which you were then taking was completed the price to the Government for its armor plate could be or would be less?

Mr. WHARTON. No, there never was such an understanding. On the contrary, not exactly in controversion of that theory but it leads the other way, Mr. Whitney stated to me that he was perfectly aware that the contract which he then had to give out was not a sufficient inducement for the erection of such works as this country needed. He had been able to get appropriations, I think, for something over $4,000,000, or about $4,000,000, I do not remember the figures exactly. That included armor plates and gun forgings. He said, "So much I can give over to an establishment that can do the work."

When the time came there was another bidder. We were not the only bidders, but the other establishment had not gone to the practical point. It would have been experimental with them. However, they did bid. But Secretary Whitney was perfectly aware that the contract he had to offer was not a sufficient inducement, and he said so to me in a very emphatic manner. "But," he said, "you will get other work." There was no implication that it would be at lower prices, but on the contrary the implication was that we would get other work at the same price. There was no obligation; it was an implication, not an understanding.

Senator SMITH. Before we go any further with Mr. Wharton, I owe

it to the gentlemen present to explain why this bill was introduced. I did so, first, because the impression I received as a member of the Naval Affairs Committee was to the effect that in the price given to you and Mr. Carnegie for the armor which you have furnished the Government up to this time there was practically a subsidy to an extent that almost paid for the erection of your plants.

The Government having done that, and you gentlemen still owning the plants, we felt that the time had now come when, if you could afford to give other Governments a better figure on the armor plate furnished to them than you gave to this Government, which had practically furnished the money for the erection of the plants and did not own them, our Government was entitled, at least, to as good consideration at your hands as foreign Governments. If we were not going to receive that consideration, as we believed we were not (and that was assured us by Secretary Herbert, who said that he had asked for some bids from both of you gentlemen and the price had been reduced only about $50 a ton), I think the committee felt pretty generally as I did myself that we owed it to the people to erect armor-plate works of our own, so that at least we would get a portion of the armor plate at a fair cost to our Government, and would have some basis to go on as to what would be fair and right to pay. That is what brought about the introduction of the bill.

In connection with it most of us, I think, from the fact that there were only two concerns in this country manufacturing armor plate and that the bids of both were the same, naturally came to the conclusion that there was an understanding between the two companies as to what prices they would bid for this Government's work. On that theory and on that basis, believing it was not for the best interest of the Government to have its armor plate furnished under such conditions, I introduced the bill. We can not expect business men to give us their secrets. That, of course, is something we all know too well would be unfair; but at the same time we would like to know, if we can, whether there was not some indirect understanding when these contracts were made that there would be a reduction in price thereafter; and secondly, whether we are not entitled to some consideration because of the fact, if it be a fact, that we helped by an indirect subsidy toward paying for the erection of the plants.

Mr. WHARTON. All that line of thought is a very natural one. I do not wonder that you took it up. I do not wonder that you feel that the country ought to have some light upon this subject, and I think it is in the way of getting it at this moment.

The contracts that we took from the Government amounted, approximately, to the amount of money we have spent; that is, we get about $4,000,000 and we spent $4,000,000 in the plant. How can anybody draw from the situation the conclusion that the Government paid for the plant when it paid merely the market price for the products of the plant, and when the total gross amount which the Government paid is no more than the works cost? I think it would require some ingenuity to show where the subsidy comes in.

Then, as to reduction in price, the Government does virtually get a reduction in price of a most important nature; that is to say, it gets a much higher quality of armor than it did at the beginning. We in this country have advanced the art. We have led all other countries in the world in the manufacture of armor plates, and we are now at the head. We did that. The Government did not do it. But we are giving *the Government the* advantage and benefit of all the progress that *has been made.*

We are getting now (I speak again with some diffidence because I do not carry the figures in my mind) practically the same price for an article which is so much better that we can hardly express it in percentages.

The actual cost of adding nickel, the actual cost of casehardening, is somewhere between 15 and 20 per cent of the original cost per ton of our armor plate. Now, if we give to the Government these plates, that cost 15 or 20 per cent more, at somewhere near the same price that it paid for the plain steel uncasehardened armor, the Government is getting that advantage; it is getting that diminution in price.

Senator BACON. In the original contract which you made with the Government there was an item for 3-inch deck plate at $490 a ton. Do you recollect that item?

Mr. WHARTON. Yes.

Senator BACON. Was that a correct price?

Mr. WHARTON. I do not remember the price. We will assume it was right.

Senator BACON. I ask you whether that item was at a price which was proper and the market price at the time for plates of that kind?

Mr. WHARTON. I presume it was. I do not remember the price, and I can not answer your question, therefore, with the sharpness it deserves.

Senator BACON. You may say approximately. It has been developed that in place of the 3-inch plate there were substituted three thicknesses of inch plate, at a saving of over $300 per ton. How do you account for the difference between the price of $490 a ton for the 3-inch plates and the price of the three thicknesses of inch plate?

Mr. WHARTON. The Bethlehem Company did not make those plates. We were not fitted up for making those plates, and therefore by an understanding with the Department those thin plates were transferred

Senator BACON. I am not asking as to the cause of the change.

Mr. WHARTON. I am pointing out to you, however, that the Bethlehem Company did not make the plates, and therefore we are not the proper persons to ask.

Senator BACON. Still, you are in the business, and would at least know the approximate cost of plates of that kind. It has been developed here that those plates were substituted for the 3-inch plates, which were originally designed, and that they cost from forty-odd dollars per ton up to $140 per ton, according to shape and bending, etc.

Senator SMITH. At a saving of $400,000.

Senator BACON. At a saving of about $400,000 on that item.

Mr. WHARTON. I am not the proper person to ask about that matter, because I was not a party to it.

Senator BACON. You know the market value of such material?

Mr. WHARTON. I do not think it is my place or that it would be becoming in me to say anything about it.

Senator BACON. If I were asking you to tell me whether or not the inch plate had been sold to the Government at an excessive price, you might feel some delicacy in replying. But I ask you as an expert to explain to the committee the difference between the cost of the inch plates and the 3-inch plates, where the difference was so great that in the substitution of one for the other about $300 per ton was saved.

Mr. WHARTON. We did not save anything in that way. I repeat that it would not be becoming in me to speak on that subject.

Senator BACON. I am not asking you for the purpose of trying to show that the charge was too great. I am merely asking the question for the *purpose of getting an* explanation.

Mr. WHARTON. We did not supply those plates. I do not know what they cost. We never made plates of that kind. We were not in a position at Bethlehem to do so.

Senator BACON. I believe the cost of plates is determined by the bending, etc.?

Mr. WHARTON. It is not so much the bending. The bending is insignificant. It is the shaping.

Senator BACON. Then the bending and shaping. Is that operation more expensive in a thick plate than in a thin plate?

Mr. WHARTON. Yes, sir. The shaping of the thick plates is done by machine work; that is, the superfluous material is cut off by machines built especially for that purpose.

Senator BACON. You can not state whether the difference between the cost of manipulating in that way a thin plate and the cost of so manipulating a thick plate would be sufficient to account for that great difference in price?

Mr. WHARTON. You may have noticed on one or two occasions that I dislike to make estimates or guesses in the absence of proper information. I am not informed on that subject, because we never made those plates; but there is no doubt that they could be produced at a lower price than thick plates, which have a great deal of machine work upon them. But when you come to a large job like this you take the fat and the lean together. In a large contract, comprising several sorts of work, you take the whole thing together at a certain range of prices, so much for this and so much for that, composing a satisfactory and reasonable price for the whole. That is the way in which contracts are made.

Senator BACON. In other words, the high price of one article is offset against the low price of another?

Mr. WHARTON. We try to make the contract so that the prices will average right.

Ex-Secretary TRACY. If the Senator will permit me, you remember I stated that in this same schedule there was some other armor the price of which I did not know and could not tell, but that the average price of the whole schedule was $490 per ton.

STATEMENT OF MR. ANDREW CARNEGIE.

The CHAIRMAN. Mr. Carnegie, we desire generally the same information from you as to your works that Mr. Wharton has given us in respect to Bethlehem.

Mr. CARNEGIE. Mr. Chairman and gentlemen, then I can only corroborate what Mr. Wharton has said. Our own experience in the manufacture of armor corresponds exactly with his. We were nearer toward making armor than the Bethlehem Iron Company, having very powerful machinery for our own business, but we declined to go into its manufacture when invited by Secretary Whitney. We declined to Secretary Tracy, his successor. My judgment never was in favor of going into the armor business. I knew it could never be a safe, permanent, and profitable business. It has not been as profitable as several departments of our own business, even in proportion to capital invested, and it requires infinite care, skill, and constant attention. That gentleman [pointing to Mr. Tracy] and the President of the United States are responsible for forcing us into the making of armor. If it had not been for a telegram received when I was abroad, stating that Secretary Tracy

had requested us to do so, as our duty, to help the United States Government out of its difficulty when its ships were standing in the stocks and it could not get armor, you would never have found the Carnegie Steel Company engaged in the manufacture of armor.

The CHAIRMAN. You did so because of the failure of the Bethlehem Company to fulfill their contract?

Mr. CARNEGIE. It was only a delay, not a failure.

The CHAIRMAN. It was an inability.

Mr. CARNEGIE. No; the Bethlehem Company were too sanguine. They did not know so much about armor making as I think I did. I had often visited the European works, and nothing could have induced me to go into the manufacture of armor plate as a money-making business. If we had put the money we have in the armor plant to-day and the time and skill into our own regular business, we could have made much more money than we have made, and we would have had no trouble.

We sometimes make 150,000 tons of steel per month, and the petty 300 tons of armor that we make give us more trouble than all the 150,000 tons. It takes the best brains and the unremitting attention of the staff away from our business, and I have never ceased to regret the day that we were called upon to undertake the task.

Senator HALE. Why did you go into it?

Mr. CARNEGIE. Because the President of the United States and the Secretary of the Navy had told us that the United States Government was in a difficulty, and if the President of the United States were to ask me to-day to double our armor plant I would do it. If he were to ask me to go to Kamchatka for the United States, I would do it. I never went into this business for money. I knew better.

Senator HALE. It was because of your patriotism?

Mr. CARNEGIE. Yes, sir; just, Mr. Senator, as you would obey the wish of the Commander in Chief of the United States, the President, if he told you that you were the only person that could serve your country. Mr. Tracy can tell you how often we declined. Secretary Whitney can tell you also. But when we did go into it I personally took up the matter with our partner, Mr. Lander. We visited the tool makers of Europe, contracted for tools nearly completed, paying a bonus to those entitled to get them. Three sets of men began work at our works, eight hours each, never stopping even Sundays or Sunday nights. We rushed everything, and in twelve months—November to November—after the contract was signed we delivered the armor. Had we done what we did for any European Government, a peerage or the Legion of Honor would have been offered to us.

Ex-Secretary TRACY. I have said, Mr. Carnegie, that I did not recall how the first interview between Mr. Abbott and myself came about. Have you any information on the subject? If you have, I wish you would give it to the committee. You know what occurred at the Department.

Senator HALE. What brought you to Washington?

Ex-Secretary TRACY. Do you recollect?

Mr. CARNEGIE. I remember the first time Mr. Secretary Tracy spoke to me in Washington about the matter. You said, "How is it, Carnegie, that we can not get steel that will stand our specifications except from you?" I said, "Mr. Secretary, because nobody in the world has machinery powerful enough to make it except ourselves. We have the most powerful mill in the world."

Ex-Secretary TRACY. I remember that statement.

Mr. CARNEGIE. You then said to me, "We are getting into a hole about armor. I can not get it. If we can not get it you will have to do the best you can to get the Government of the United States out of trouble." Did you not, Mr. Tracy? I left you, and when I was abroad I got a telegram from Mr. Abbott advising me that you had sent for him—he was then our chairman—and wanted us to help the Government out of its trouble and go into the manufacture of armor. Mr. Blaine also spoke to me about it, and said it was feared there would not be a ship finished during the administration of President Harrison. I believe the Cabinet congratulated Secretary Tracy upon the bargain that he had made which brought us into the armor business.

Mr. Chairman, one reason why armor making is not profitable is that we get only about 3,000 tons a year. We have $3,000,000 invested in the plant. We have to stop that plant every now and then for five or six months, but interest and maintenance run on, and some of our best men we must keep. Our men have just been scattered for six months now. We took a contract from the Russian Government for 1,000 tons of armor, and that has kept them running a few months, but in three weeks from now part of them will be out of work, and all of them will be idle again three months, for it will be three months before we get a chance to make armor plate for any of the new battle ships, and no concern—Senator Smith, you are a manufacturer and know that this is true—can be successful or make money under such circumstances.

When Secretary Tracy asked us to go into the making of armor, and we had reluctantly consented, it was a question of price, and we said that we could take no advantage of the Government's necessities. Whatever was the price paid the Bethlehem Company, which was the lowest bidder in competition, there being three parties in all, was our price. It was exactly the English price, as near as I could figure it.

I was amazed that the Bethlehem Iron Company bid at such a price, for armor making is largely a question of labor, and we ought to have 30 per cent more for armor in this country than they get in England, as skilled labor costs so much more. I think if the Government of the United States gets its armor at the same price as England pays it is to be congratulated. Our armor is superior to any. However, we went on. Requirement after requirement was made by the Government of the United States. The armor we are making at present costs us $105 a ton more than the armor we contracted for; not that the Government does not pay the extra cost, for it does pay it; but it costs us that much more. This causes the cost per ton to seem high, but the armor now furnished is really cheaper than the first, as its resistance is so much greater. I will just give you the items.

We contracted with Secretary Tracy to make common steel, such as Great Britain and France and Germany were getting made. It was afterwards changed to nickel. Nickel is harder. I once heard that the President said Mr. Tracy could make good bargains. He did make a good bargain with us. He allowed us only $10 a ton more to make nickel steel.

Then we go on to the Harvey process. The Secretary of the Navy wanted harveyized armor. He required us to build the furnaces for Harvey armor, which are good for nothing else in the world. We spent over $200,000 on them. Anybody else would have spent $300,000, because we had the ground, the connections, the heat, and the water, and we had our staff. We have harveyized only about 4,000 tons of armor, and if the Government adopts some other process to-morrow the Harvey *furnaces* are a complete loss to us; they are specially con-

structed for this process and are good for nothing else. The Secretary allows us $50.80 a ton for that, while the British Government allows $100 a ton for the same.

The CHAIRMAN. Just double.

Mr. CARNEGIE. Yes. They allow it in this manner: The manufacturer divides it. He says "There is $60 a ton for the armor," for which we get $50.80. Then he charges 2 cents a pound royalty for the Harvey process; that is $40. Secretary Tracy bought the right to use the Harvey process for $100,000, and of course it does not cost the Government the royalty. But in England the manufacturers own five-sixths of the Harvey patent, and therefore, by my figuring, they get $93 net for harveyizing and we get $60. The other $7 goes to the American shareholders in Harvey patents. The British Government pays, as I have said, $100 per ton. They do not harveyize thin plates. They have not been able to do it. We are compelled to do it, and it is very difficult and costly.

Senator HALE. Deck plates, etc.?

Mr. CARNEGIE. Turret plates. It is very hard to do. Now, under the Harvey process, it takes a month to harveyize every plate.

Senator HALE. Thirty days?

Mr. CARNEGIE. Yes, sir; it takes a week to heat it in a great furnace up to the necessary temperature. It takes two weeks to harden it. It takes a week for it to cool. All our operations are delayed one month for every plate we harveyize. We are not paid fairly for this work. Thus nickel costs $10 to work over plain steel; there is $45 per ton patent royalty; total $55. Harvey costs $50; that is $105. Then we are now required to reforge armor under our own patent. I have just received the London Engineer, which gives its annual review of naval affairs. This is the highest authority. I will not read it all, but I quote its concluding words: "Double forging has come in the United States, and the recent 'record breakers,' as they call them, have chiefly been double-forged plates of Carnegie." That is our record.

Senator HALE. You have a patent upon that process?

Mr. CARNEGIE. Yes, sir.

Senator HALE. The Corey patent?

Mr. CARNEGIE. Yes, sir; but we do not charge the Government any royalty for it. If the Government of the United States would give us what the British Government gives its armor-making plants, steady work, we should be all right. For instance, to-day you see in the papers that it has ordered five more battleships. The British armor-plate establishments have never been out of work for I do not know how many years; I should say ten. They work night and day. One of them made 6,000 tons last year. What do we get? Scarcely anything this year.

If the Government would keep us in work, 6,000 tons a year, it would be a highly profitable business; but as it is now, gentlemen, I assure you that many departments of our work are making more money and have made more money on the capital. Note Mr. Wharton's figures: Six millions invested means annual interest $360,000. Upon 3,600 tons of armor this means $100 per ton interest cost. Assume that the Government orders armor for ten years and then its Navy is finished; this means that $400,000 per year depreciation upon plant has to be charged—more than a second hundred dollars per ton. Because some uninformed people only see the high price per ton, and do not calculate properly, they think armor plants are extremely profitable. They are not so *Take the $3,000,000* which we are just now spending for blast furnaces.

know that investment will make more profit than the armor-plate plant, and it costs about the same. It will involve no special care, have few if any stoppages, and be in use as long as we can look ahead. It is a far more desirable investment of capital.

Senator SMITH. What is the capacity of your armor-plate establishment?

Mr. CARNEGIE. It is about the same as that of Bethlehem. The present Secretary of the Navy recently asked me how much we could do. I replied, "It is a question of money." If the Government of the United States give us 20,000 tons of armor to make, we can double the plant and furnish it before they are ready for the plate. Someone has asked to-day, I think it was Senator Hale, why we did not increase the capacity of our plants to fill the Government wants. I will take a contract to deliver all the armor that the Government wants—Bethlehem could close, or Bethlehem could continue and we shut up—and make all the armor. Neither establishment can be kept more than half employed at the present rate. Another gentleman asked about the Government erecting an armor plant. Gentlemen, you can not make armor without making steel, can you?

Senator SMITH. Not very well.

Mr. CARNEGIE. I wish the committee would come with me and visit the armor plant and let us show you what we have. In order to make armor plate we sometimes have an ingot weighing 150 tons; that is for the big plates we have to make. We cut off one-third from the top and one-third from the bottom of this ingot. We are not required by the contract to do it; one-third is what we are required to cut off by the contract, but we find we can not make armor plate that will break records without throwing away one-third at bottom and top. The pure, solid steel is in the center of the ingot.

We get five or six of our steel-melting furnaces running into a great pit until 150 tons are there. By an electric crane we lift 150 tons right up. That is all the Government business for two days that the plant will have to do, as a rule. If it is a 40-ton plate, we would not cast another until the third day. If you have other work for the heating furnaces, where you are making steel, it would be all right. As it is with us, we keep the furnaces and the forces busy upon general work and only cast an ingot for armor once in two or three days. That is one reason why no Government has attempted to make armor. It would have to go into the steel business. Armor making is an adjunct to a great steel-making concern. The tonnage for armor is so small, 3,000 tons in a whole year, when we make sometimes in one month 150,000 tons of steel.

The CHAIRMAN. What amount have you estimated that you have spent for this purpose to compare with Bethlehem?

Mr. CARNEGIE. About $3,000,000 for such additions as were necessary to our pre-existing steel-making plant; we had nothing to spend for making the steel for armor. Our books show $2,500,000 and something over, I think, but we charged nothing for the land, nothing for the connections; we charged nothing for water, for light, or for superintendence, or for any thing like that, because we had all those things. Half a million would not cover what we supplied beyond the $2,500,000.

The CHAIRMAN. The actual cost was about $2,500,000?

Mr. CARNEGIE. The actual cash expenditure, and what we ourselves contributed, as just explained, making three millions. Mr. Wharton's figures, in my opinion, are right. The Government would spend about $5,000,000 certainly to make a steel-making plant and an armor-plate

plant for the Government. We should have to do so if we had to start de novo and were not in the steel-making business——

Senator PERKINS. It would require another million for stock.

Mr. CARNEGIE. You can not do it for $1,000,000. We have to-day in one group nearly half a million of dollars' worth of finished armor waiting test and acceptance by the Government. It takes much more capital now since everything takes one month longer for Harvey process.

The CHAIRMAN. In your judgment, then, to start an establishment for this purpose equal to yours—I do not mean the entire establishment, but simply the armor-plate plant—it would require about $10,000,000 of capital?

Mr. CARNEGIE. Five million dollars.

The CHAIRMAN. For capital and all?

Mr. CARNEGIE. Five million plant and two million capital, as Mr. Wharton says—$7,000,000.

Senator CHANDLER. What did you say about the foreign armor makers having an interest in the Harvey patent?

Mr. CARNEGIE. The continental manufacturers purchased the Harvey patent. They purchased it for $100,000 cash for Great Britain, and a sixth of the stock. Therefore the British manufacturers have five-sixths of that stock. One hundred thousand dollars for Great Britain in proportion to the armor it makes would be equal to about $15,000 for the patent right for the United States.

Senator CHANDLER. That is the way they disposed of the Harvey patent?

Mr. CARNEGIE. Yes, sir. It is a profit to the manufacturers. They charge the British Government $40 per ton royalty and $60 as cost of the process.

Senator CHANDLER. That is about 2 cents a pound?

Mr. CARNEGIE. Yes, sir.

Senator CHANDLER. The United States, having made a contract at a half cent a pound, may be said to have bought out the patent right?

Mr. CARNEGIE. Yes, sir; the foreign manufacturers bought the patent and the United States Government bought the patent. The United States Government, I think, paid $5, or something, per ton.

Ex-Secretary TRACY. A half cent a pound.

Mr. CARNEGIE. Very well. The British Government pays 2 cents a pound to the manufacturers. We have not anything.

Senator CHANDLER. And they own five-sixths of the stock.

Mr. CARNEGIE. Yes, sir. They pay themselves back. We have no patent for which we charge the Government. We are not interested in the nickel process, or in any other patent other than our own Corey patent, which was invented in our own works.

Senator CHANDLER. How many patents have you?

Mr. CARNEGIE. Only our own patent. The Corey, as far as armor is concerned, and one for nickel.

Senator CHANDLER. How many patents are there, your own and other people's patents, on the armor that you are going to bid for, or have already bid for, to the Secretary of the Navy?

Mr. CARNEGIE. There would be the nickel patent and the Harvey patent.

Senator CHANDLER. What do you mean by nickel reforging?

Mr. CARNEGIE. No. The introduction of nickel into steel.

Senator CHANDLER. What are those patents?

Mr. CARNEGIE. The Schneider patents.

Senator CHANDLER. Then there is the Harvey process. the nickel, and the process of reforging?

Mr. CARNEGIE. Yes, sir.

Senator CHANDLER. What else is patentable, or what other patent do you use or will you use to carry out the new contract with Secretary Herbert, if one is made?

Mr. CARNEGIE. I can not recall any other important patents.

Senator CHANDLER. Those are all the patents that now occur to you?

Mr. CARNEGIE. Yes, sir.

At 3 o'clock and 50 minutes p. m. the committee adjourned.

PRICES OF ARMOR FOR NAVAL VESSELS.

WASHINGTON, D. C., *February 29, 1896.*

The committee met at 12 o'clock.

Present: Senators Hale, Chandler, Perkins, and Smith.

Mr. Charles C. Stauffer appeared before the committee.

Senator Chandler submitted correspondence to be placed in the record, as follows:

UNITED STATES SENATE,
Washington, D. C., February 8, 1896.

SIR: It seems to me that it will be wise in any future contracts for armor to require, as to all patents used in its manufacture, that the Government shall be given the right to use those patents and any improvements thereon in any additional manufacturing of armor, whether directly by the Government itself or by any contracting manufacturers whatever.

This requirement will obviate, to some extent, the argument that the Government is building up two armor factories which do not compete but combine with each other, and which by multiplying patents upon the modes of manufacturing armor are accumulating restrictions upon the processes used so as to make it difficult, if not impossible, for the Government either to establish its own factory or to encourage the opening of a third factory if future events should make it for the public interest to pursue this course.

Very respectfully,

WM. E. CHANDLER.

Hon. H. A. HERBERT,
Secretary of the Navy.

NAVY DEPARTMENT,
Washington, February 10, 1896.

MY DEAR SENATOR: Answering yours of February 8, in which you suggest that in future contracts for armor it would be wise to require as to all patents used in its manufacture, that the Government shall be given the right to use those patents and any improvements thereon in any additional manufacturing of armor, whether directly by the Government itself or by any contracting manufacturers whatever. I agree with you that it would be well to put in such provision if the armor manufacturers would consent, but, in my opinion, they would not. They would, of course, see the purpose of such a provision and would refuse to consent to it. What then would be the condition of the Government? I could simply refuse to make a contract, and they would hardly believe that I would take this step.

I told *you about the* warm controversy I had with these people and

the threat I made to induce them to make a reduction of $50 per ton. The threat was, that I would appeal to Congress.

If Congress, considering this matter now, does nothing, but leaves the Department where it has been, then you will observe that the Department will be left in the hands of these people. If I am to have any power in the premises to dictate terms, Congress must give it to me now. This can be done in two ways: One is to authorize the Department to establish works of its own, and I do not think this is practicable. When we take into consideration the cost of the plant and the cost of operating and keeping it in condition, it does not seem to me that the experiment would pay. However, if Congress authorizes the conditional establishment of such a plant, I will use the power for all it is worth. The other method would be to authorize the Government, in case of a combination against it by its own manufacturers, to contract for armor abroad. I am not in favor of getting our armor from abroad and I do not think the country is, and if I had the power to resort to foreign contractors I should only do it in case I was furnished with the plainest evidence, not only of combination, but extortion. A law which would give this power to the Department would be, if wisely administered, an efficient check upon extortion, but it is not my opinion that Congress would pass it. Such a law would be the simplest remedy.

Very respectfully, yours,

H. A. HERBERT,
Secretary.

Hon. W. E. CHANDLER,
United States Senate, Washington, D. C.

UNITED STATES SENATE,
Washington, D. C., February 21, 1896.

SIR: Will you kindly give me a memorandum specifying all the patents or patent processes which will be used either by requirement of the Department through the specifications which it prescribes, or by the contractors of their own motion, in manufacturing the 5,650 tons of armor plate for which the Department is now authorized to make contracts? The information asked for to be laid before the committee in the course of its pending inquiry.

Very respectfully,

W. E. CHANDLER.

Hon. H. A. HERBERT,
Secretary of the Navy.

NAVY DEPARTMENT,
Washington, February 24, 1896.

SIR: The Department has the honor to acknowledge the receipt of your communication of the 21st instant, in which you request a memorandum specifying all the patents or patent processes which will be used either by the requirement of the specifications which it prescribes, or by the contractors of their own motion, in manufacturing the 5,650 tons of armor plate for which the Department is about to make contract, and to state that such communication has been referred to the Bureau of Ordnance for the information requested, and that as soon as it has been received the same will be furnished you.

Very respectfully,

H. A. HERBERT, *Secretary.*

Hon. WILLIAM E. CHANDLER,
United States Senate.

NAVY DEPARTMENT,
Washington, February 29, 1896.

SIR: Referring to your communication of the 21st instant, relative to processes to be used in manufacturing the 5,650 tons of armor plate for which the Department is now authorized to make contracts, I have the honor to state that the Bureau of Ordnance, which has immediate cognizance of the matter of armor for naval vessels, and to which said letter was referred, has reported thereon as follows:

The specifications require that the armor to be contracted for shall be face hardened by a process called the Harvey process, which is patented. If this patent is good the Department is pledged to pay a royalty of one-half cent per pound for all armor manufactured. The validity of the patent is now in question, and will probably soon be decided by the courts. If the patent is sustained the Department will continue to pay the royalty, otherwise no further royalties will be paid.

The specifications also require that the armor shall be reforged or double forged, which is a process patented by Mr. Corey of the Carnegie Steel Company. No royalty is to be charged the Department for the use of this process by either armor companies.

The specifications require the use of nickel steel in the manufacture of the armor.

The contract will require the manufacturer to furnish nickel steel armor, and he will have to pay any royalties if the patent is a valid one.

The Bethlehem Iron Company has obtained the right to manufacture nickel steel from the Creusot Company, who claim a patent upon the process. The Carnegie Steel Company is now contesting the validity of the patent in the courts.

The patents referred to are: Decrementally hardened armor plate, No. 460252, dated September 29, 1891; steel armor plate and process of making same, No. 541594, dated June 25, 1895; process of manufacturing the alloys of steel and nickel, No. 415655, dated November 19, 1889. No other patents are involved.

I have the honor to be, very respectfully,

W. MCADOO, *Acting Secretary.*

Hon. WILLIAM E. CHANDLER,
United States Senate.

STATEMENT OF CHARLES C. STAUFFER.

Senator CHANDLER. What is your official connection with the Interior Department?

Mr. STAUFFER. I am at present first assistant examiner in the division of metallurgy in the Patent Office.

Senator CHANDLER. Who is the principal examiner of that division?

Mr. STAUFFER. Eugene A. Byrnes.

Senator CHANDLER. Have you been shown the letter from me to the Commissioner of Patents, dated February 21, asking for information in reference to certain patents?

Mr. STAUFFER. I have.

THE HARVEY PATENTS.

Senator CHANDLER. Will you please take up first the Harvey patents, giving the information desired in reference to those patents?

Mr. STAUFFER. The patents in question are three in number.

Senator CHANDLER. Will you describe each one?

Mr. STAUFFER. The first one is a patent, No. 376194, dated January 10, 1888, and is for the process of treating low steel.

Senator CHANDLER. To whom was it issued?

Mr. STAUFFER. To Hayward A. Harvey, of Orange, N. J., assignor to the Harvey Steel Company of New Jersey.

Senator CHANDLER. State now, if you please, in reference to that patent—which you say is the first one to Harvey—what is patented.

Mr. STAUFFER. I will read certain paragraphs.

This invention relates to a method of treatment by which the characteristic qualities of refined crucible steel are imparted to steels of low grades—such as Bessemer steel, basic steel, etc.—whereby such steels are made capable of taking any prescribed temper, and are adapted to be manufactured into machinists' tools, axes, knives, fine cutlery, or cutting or abrading instruments of any kind, and by which such low steels are given increased tensile strength and are rendered weldable, so that they can be piled and reworked without difficulty.

Then he goes on to say:

The essential conditions of the method of treatment to which the ingot or other body of steel is subjected are the presence of carbon, the absence of oxygen and high temperature—i. e., a temperature above 1,500° F.—the degree of temperature being varied according to the degree of hardness which the product is required to be capable of taking in the subsequent process of tempering.

The absence of oxygen is effected by keeping the steel while subjected to this high temperature in contact with carbon. The carbon acts as a seal to exclude oxygen from the metal. The carbon which he uses is preferably wood charcoal granulated or powdered.

Senator CHANDLER. Is that a substantial statement of what was patented to Mr. Harvey in that patent?

Mr. STAUFFER. I think so.

Senator CHANDLER. What do you regard as the novelty which was there patented?

Mr. STAUFFER. The novel feature was the exclusion of the air in combination with a high temperature, a temperature above 1,500° F., or, as defined in the claim, a temperature above that at which cast steel will melt, which would be from 500° to 600° higher than 1,500°. The 1,500° is the lowest limit beneath which it would not be practicable to go. The working limit is considerably higher.

Senator CHANDLER. What does the patent state to be the effect upon the steel; merely that of making it harder for the purpose of tool steel?

Mr. STAUFFER. Yes; that is, the immediate effect of it is to render it capable of being hardened, rather than directly hardening it. It supplies to the surface of the iron or steel an increased quantity of carbon, and the effect of that carbon when the plate is afterwards tempered is to make it harder. The presence of a considerable quantity of carbon in steel has that effect. If a smaller quantity of carbon is present, as in Bessemer steel, the steel is not capable of becoming quite so hard.

Senator CHANDLER. Then, strictly speaking, the patent process resulted in carbonizing steel and not in hardening it as a part of the same process.

Mr. STAUFFER. That is correct.

Senator CHANDLER. Does the patent cover any method of afterwards hardening the carbonized steel?

Mr. STAUFFER. I do not think this one does.

The patent referred to is as follows:

[United States Patent Office. Hayward H. Harvey, of Orange, New Jersey, assignor to the Harvey Steel Company, of New Jersey. Process of treating low steel. Specification forming part of Letters Patent No. 376,194, dated January 10, 1888. Application filed December 8, 1886. Serial No. 221,026. Specimens.]

To all whom it may concern:

Be it known that I, HAYWARD A. HARVEY, of Orange, New Jersey, have invented a certain Improvement in the Treatment of Low Steel, of which the following is a specification.

"This invention relates to a method of treatment by which the characteristic qualities of refined crucible-steel are imparted to steels of low grades—such as Bessemer steel, basic steel, &c.—whereby such steels are made capable of taking any prescribed temper, and are adapted to be manufactured into machinists' tools, axes, knives, fine cutlery, or cutting or abrading instruments of any kind, and by which such low steels are given increased tensile strength and are rendered weldable, so that they can be piled and reworked without difficulty."

"The essential conditions of the method of treatment to which the ingot or other body of steel is subjected are the presence of carbon, the absence of oxygen, and high temperature—*i. e.*, a temperature above 1,500° Fahrenheit, the degree of temperature being varied according to the degree of hardness which the product is required to be capable of taking in the subsequent process of tempering." The higher the temperature is the higher is the temper which the product is rendered capable of taking.

In carrying out the treatment the ingots or other bodies of steel which are to be treated are embedded in a finely-powered carbonaceous material, preferably hard-wood charcoal, contained in crucibles, boxes, or receptacles made of plumbago or some other refractory material, and provided with covers to prevent the charcoal from being consumed.

No special kind of furnace is required; but in practice a furnace of the regenerative type may be preferred, both for the sake of economy in fuel and because of the rapidity with which the heating operation can be performed.

The shape and dimensions of the furnace-chamber will of course be governed by the shapes and sizes of the ingots or other bodies of steel which are to be treated. For example, ingots, say, two inches by three and eighteen inches long may be treated in receptacles nine inches by ten inside, and, say, twenty-four inches long. Such a receptacle will serve to contain six ingots separated from each other and from the walls of the receptacle by thicknesses of one inch of powdered charcoal, and separated from the bottom of the receptacle by a layer of one inch of powdered charcoal, and from the cover by a layer of, say, three inches or more of powdered charcoal.

The fire-chamber or heating-chamber may be proportioned with reference to containing any desired number of boxes or other receptacles for the charcoal. The boxes or other receptacles for the charcoal may be heated by direct contact with a body of incandescent fuel, in which they are embedded; or they may be deposited in a heating-chamber and be heated by contact with or radiation from the flames conducted through such heating-chamber. The time required for the heating operation will depend, of course, upon the dimensions of the body or bodies of steel under treatment, and also upon the efficiency of the furnace employed. The object to be accomplished is the uniform heating

throughout of the body of material under treatment, which, for present convenience, may be called "raw steel."

If the raw steel is in a large mass or masses, the heating operation will have to be conducted more slowly in order that the interior of the mass of raw steel may be raised to the required temperature without melting the crucible or box in which the raw steel is packed. When the raw steel is embedded in powered charcoal contained in a covered crucible, it may be raised above its ordinary melting-point without being melted, and certain excellent results are produced by raising the raw steel to upward of 3,000° Fahrenheit. When the desired temperature has been reached and the heating operation has been so conducted or prolonged as to have insured the uniform heating through of the material under treatment, the receptacle containing such material is at once allowed to cool off, and, if desired, may be removed from the furnace to hasten its cooling. By this treatment raw steel, which previously could not be welded or tempered, becomes weldable and undergoes a transformation by which its tensile strength is increased, and by which it acquires the characteristics of refined crucible steel, or so called "tool steel" of the higher grades.

There are a great variety of existing furnaces in which the process can be conducted. Such furnaces of course vary in their efficiency; but a few trials by an operator skilled in the management of any particular form of furnace will suffice to determine the time required for conducting the process in such furnace, and also for varying the process with reference to the qualities which it is desired the product shall possess. Thus, for example, if a product capable of taking a temper of a very high degree of hardness be required, the material under treatment will be raised to a temperature, say, of about 3,000° Fahrenheit. The product, which has been raised to about this temperature and allowed to cool off to a temperature of, say, 200° or 300° Fahrenheit before being removed from the powdered charcoal in which it has been embedded, will on removal be found very soft, will exhibit a clean surface of a dull gray or zinc color, and will be capable of taking a temper so high that tools made from it and hardened will cut chilled iron, and may be sucessfully used for turning chilled-iron rolls.

By so varying the process as to lower the extreme limit of temperature to which the material under treatment is raised the product when cooled off will exhibit a clean surface of a slightly-golden tint, and will be capable of taking a temper nearly as high as that which the gray-colored product is capable of taking. By further lowering the limit of temperature to which the material under treatment is raised the product when cooled will exhibit a surface of a pale-blue tint, and will be capable of taking a temper somewhat lower than that which the golden-tinted product is capable of taking. By still further lowering the limit of temperature to which the material under treatment is raised—say, for example, to a temperature of about 1,500° Fahrenheit—the product when cooled will exhibit a surface of dark-purple color, but will be capable of taking a low temper.

The tints referred to are similar to those which are exhibited upon the surface of a piece of ordinary tool steel after it has been heated and while its temper is being drawn. In the case of such a tool the color which it finally exhibits after the tempering operation has been completed indicates the degree of hardness which it then possesses, different colors indicating different degrees of hardness. If the tool is very hard, its surface may have a gray color; if it is slightly less hard, its surface may have a straw color or golden tint, and if still less hard its

surface exhibits a blue tint, and if it possesses only a moderate degree of hardness its surface may have a dark-purple tint. In the case of such tool steel these colors are respectively the invariable accompaniments of various degrees of hardness. On the contrary, in the present process the several colors exhibited, respectively, by a number of objects which have been heated to different degrees of temperature and allowed to cool before being removed from their charcoal beds do not indicate like differences in hardness then possessed by those objects, the fact being that they are all of them comparatively soft. What their colors do indicate is the extreme limit of hardness to which they can be respectively brought in the operation of tempering them subsequently. Thus a product of pale-blue tint can in the process of tempering be brought to the condition of hardness which is ordinarily accompanied by the appearance of the blue tint upon the surface, but cannot be made any harder. Its temper, however, can be drawn down so that it will be that indicated by a dark-purple tint upon the surface. Similarly, a product of the present process exhibiting a golden tint, or straw color, can in tempering be hardened to straw color, but no higher, and its temper can be drawn down to a pale blue or to a dark purple. The same principle holds good as to the product having the gray tint, which, in tempering, may be given the extreme hardness indicated by the gray tint, and may have its temper drawn so that it will exhibit in succession all the ordinary variations in color down to the dark-purple tint. It will therefore be perceived that in practicing the process herein described the color exhibited by the product upon its being removed from the charcoal, after having been allowed to cool off therein, affords a reliable indication of the character of the product as to its capacity for tempering, so that it will not be necessary to actually test the product before hardening it to find what its qualities are.

In practice it will not be necessary that the products which have been treated shall remain in the charcoal bed until perfectly cool. They may be removed as soon as they are cool enough to be handled.

If removed while hot, their surfaces will of course be more or less oxidized by exposure to the air, and they will be slightly harder. Such oxidation will to some extent obscure their colors, but will do no material harm. The principal useful effects produced result from the high temperature to which the objects under treatment are subjected and do not depend upon the method of cooling. As the products of the treatment exhibit different colors according to the temperature employed, so different parts of the same ingot or bar may be made to exhibit different colors by subjecting such parts to different temperatures. For example, the ingots or bars under treatment may, if desired, be subjected to intense heat at one end and to a lower heat at the other end, so that they will exhibit when removed from the charcoal a gray color at the ends which have been most intensely heated and a blue or purple color at the other ends, and the regular series of intermediate colors between their gray and purple portions. All parts of them, however, will be found to have acquired the property of weldability, so that they can be readily piled and reworked. After a furnace has been tested by trial and the colors exhibited by the products under different conditions of treatment have been observed, the character of the results which will be produced by a prescribed duration of treatment in that furnace will be known; hence all that is required is to carefully reproduce in repetitions of the treatment the conditions as to heat and duration which have previously been noted as those which result in the yield of products *having the* required color—that is, products having the *capacity to take in tempering* the degree of hardness desired.

It is difficult, and in the case of ordinary furnaces impossible, to accurately measure such high temperatures, and in view of this fact, and also in consideration of the varying efficiency of different furnaces and of different fuels, the more practical method of conducting the process will be by regulating the duration of the heating operation, after having first ascertained by trial what length of time is taken in the particular furnace and with the particular fuel employed, whether solid or gaseous, to heat the material under treatment to such a temperature as will produce a product of the desired color.

The temperatures herein mentioned are to be regarded simply as approximations to the actual temperatures employed in practice. It is not necessary that these temperatures, which cannot easily be measured, shall be herein accurately prescribed, because the observation of the periods of time occupied in the particular furnace and the observation of the colors which the treated ingots respectively exhibit, with the particular fuel which may be employed, affords all the information required for the subsequent successful production of ingots having like colors by the use of similar fuel in the same furnace.

A single ingot, say, two by three inches and eighteen inches long, deposited in powdered charcoal in a crucible, say, five inches in diameter and twenty-four inches long, can be successfully treated by keeping such crucible embedded in a free-burning coke fire for a period of from four to six hours. A larger ingot or a number of ingots contained in a larger crucible may require a longer time—as, say, fifteen or twenty hours—to insure uniform heating throughout to the required temperature.

The product produced by this mode of treatment will be found to be free from scale and without blisters upon its surface. As there is no oxidation upon its surface, finished articles—such as knives, cutlery, files, and other cutting or abrading instruments made of low steel—may be subjected to the treatment without injury, and the material of which they are composed be thereby transformed into steel of fine quality.

It is to be remembered that the smaller the area in cross section of the articles under treatment the less will be the time required for their treatment under the high temperature herein prescribed, and the duration of the treatment will therefore be varied as found to be necessary in view of the sizes of the articles to be treated, as well as in view of the efficiency of the furnace and of the fuel which may be employed.

It has long been known that iron could be transformed into steel by depositing it in a bed of carbonaceous material and subjecting it to a high temperature for several days. The bars of steel so produced have their surfaces covered with blisters, and the product is hence known as "blister steel." It is also well known that such steel is not adapted for making tools for working wood or metal.

A costly product, known as "Mushet steel," has also been made by fusing malleable iron with carbonaceous matters in crucibles. The Mushet steel is of extraordinary hardness, and has hence been employed for turning chilled-iron rolls and other analogous purposes.

It will be found not only that tools made from the gray-colored product produced by the process herein described will do perfectly well all the kinds of work which tools made from Mushet steel are capable of doing, but that they are superior to tools made from any other steel whatever for certain purposes—such, for example, as boring deep holes in chilled iron or steel or turning or planing the surfaces of thin-shelled *chilled iron or steel* castings, which, by reason of their shape, cannot

be supported directly opposite the tool, and are hence liable to spring when the point of the tool is pressed hard against them.

What is claimed as the invention is—

1. The herein-described process of treating ignots or other objects composed of low steel—such as Bessemer steel—for the purpose of imparting to the metal of which such objects are composed the qualities of refined crucible steel, which consists, essentially, in embedding the object or objects to be treated in a body of granulated or powdered carbonaceous substance, such as wood-charcoal, deposited in a crucible or receptacle made of plumbago or any other suitable refractory material and provided with a cover to prevent the combustion of the charcoal, and in heating such receptacle and its contents in a furnace or heating-chamber the temperature of which is above the melting-point of cast-iron for such length of time that the objects treated when removed from the charcoal will exhibit clean unblistered surfaces of a prescribed color or colors, as herein set forth, and will possess the capacity of taking in tempering the degree or degrees of hardness ordinarily indicated by such color or colors.

2. The herein-described process for treating ignots or other objects composed of low steel—such as Bessemer steel—for the purpose of increasing the tensile strength of the metal of which such objects are composed and giving it the quality of weldability, so that it can be piled and reworked in the ordinary manner, which consists, essentially, in embedding the object or objects to be treated in a body of granulated or powdered carbonaceous substance, such as wood-charcoal, deposited in a crucible or receptacle made of plumbago or other suitable refractory material and provided with a cover to prevent the combustion of the charcoal, and in then heating such receptacle and its contents in a furnace or heating-chamber the temperature of which is above the melting point of cast-iron for such length of time that the objects treated will on removal from the charcoal exhibit clean unblistered surfaces of a prescribed color or colors, as herein set forth.

H. A. HARVEY.

Witnesses:
R. C. HOWES,
M. L. ADAMS.

Senator CHANDLER. Now, in reference to this patent, state, if you please, historically, the course of proceeding—whether there was a contest over it; whether there were what are called interferences, and whether other inventions, prior inventions, were examined in that connection. However, before you do that, state, if you please, who was the examiner who made the decision that the invention was patentable and that the patent should issue.

Mr. STAUFFER. This patent was not in interference and was not appealed. The claims in this patent are two in number, and are very limited. The examiner who signed the file is F. P. MacLean.

Senator CHANDLER. There is nothing of record, then, to show that any prior or conflicting inventions were examined by Mr. MacLean at the time he recommended the issuance of this patent?

Mr. STAUFFER. There is no record of any such conflicting applications.

Senator CHANDLER. Is it or is it not to be presumed, however, that Mr. MacLean examined to see whether there were any?

Mr. STAUFFER. It was his duty to do it, and the presumption is that he did.

Senator CHANDLER. So the issue of this patent, the records showing

no conflict or interference with other inventions, according to the custom and practice of the office, presumes an examination as to prior inventions and the ascertainment that there were none which conflicted?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. But what, if any, inventions there were which it was supposed might conflict the record does not show.

Mr. STAUFFER. The record does not show any.

Senator CHANDLER. Have you stated, then, the complete record history of that patent up to this time?

Mr. STAUFFER. I believe so. I have here an abstract of the assignment. The date of the assignment was June 17, 1887, recorded in the Patent Office July 2, 1887.

Senator CHANDLER. Please hand the copy of the abstract of title to the foregoing patent to the reporter, and it will be inserted in the record.

The abstract of title referred to is as follows:

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing found of record up to and including February 26, 1896, under or relating to letters patents granted to Hayward A. Harvey, Orange, N. J., assignor to the Harvey Steel Company of New Jersey, January 10, 1888, No. 376194, "process of treating low steel."

In testimony whereof, I, John S. Seymour, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-eighth day of February, in the year of our Lord one thousand eight hundred and ninety-six, and of the Independence of the United States of America the one hundred and twentieth.

[SEAL.] JOHN S. SEYMOUR,
Commissioner.

[United States Patent Office, copy made February 28, 1896.]

Assignor.	Assignee.	Date of assignment.	Date of record.
H. A. Harvey.....	Harvey Steel Company, a corporation under the laws of New Jersey.	June 17, 1887	July 2, 1887

Invention.	Territory assigned.	Liber.	Page.
Treatment of low steel. Appln. filed Dec. 3, '86. Ser. No. 221026. Jan. 10, '88. 376194.	Exclusive right to said invention. Patent to issue to said assignee. $1 and other considerations.	G 36..	394

Senator CHANDLER. Does your statement now made, with the two papers submitted, constitute the full history of the 1888 Harvey patent, so far as you know?

Mr. STAUFFER. It does; and up until the 28th of February, 1896, to which date the records were examined for the Senate committee.

Senator CHANDLER. Now, please go on with the history of the other Harvey patents.

Mr. STAUFFER. The next is patent No. 460262, granted to Hayward *A. Harvey, of Orange*, N. J., dated September 29, 1891. It is a patent

for decrementally hardened armor plate, by which is meant armor plate whose hardness varies from the surface to the interior, the hardest part or portion being at the surface.

I should say that the title is somewhat misleading, because one of the claims is for the method of producing such a plate and the other is for the plate as produced, so that the full title should be "method of."

Senator CHANDLER. Method of what?

Mr. STAUFFER. "Method of producing decrementally hardened armor plate and decrementally hardened armor plate."

Senator CHANDLER. The patent is intended to cover both the process and the product?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. And that is allowable in one patent?

Mr. STAUFFER. Yes, sir; it is allowable, but the title fails to state it. This specification says:

This invention embraces a method of facilitating the transformation of homogeneous low-steel armor plates into plates which present upon the side intended to receive the impact of projectiles a stratum of tenacious steel of heterogeneous crystalline structure highly and uniformly carburized and excessively hard upon its exposed surface and less and less carburized and gradually diminishing in hardness as the depth from said surface increases.

This gives a brief account of what the invention is.

The required transformation is effected by inclosing the low steel plate between a mass of noncarbonaceous granular material on one side and a mass of granular carbonaceous material packed firmly against the other side in a compartment erected within the heating chamber of a suitable furnace and in then raising the heat of said heating chamber and maintaining it at a temperature above the melting point of cast iron for a period of time sufficient to effect the desired increase in the tenacity of the steel and the supercarburization to the desired extent and depth of the side of the plate against which the granular carbonaceous material is being constantly pressed. The plate is subsequently removed from the furnace and chilled.

The patent gives the detail of the apparatus for carrying out this process, which I can explain in detail if you wish me to do so.

Senator CHANDLER. We can get that from the specification.

The patent referred to is as follows:

[United States Patent Office. Hayward A. Harvey, of Orange, New Jersey. Decrementally-hardened armor-plate. Specification forming part of Letters Patent No. 460,262, dated September 29, 1891. Application filed April 1, 1891. Serial No. 387,209. No model.]

[Diagrams are omitted.]

To all whom it may concern:

Be it known that I, Hayward A. Harvey, of Orange, New Jersey, have invented certain improvements in decrementally-hardened armor-plates and in the art of manufacturing the same, of which the following is a specification.

This invention embraces a method of facilitating the transformation of homogeneous low steel armor-plates into plates which present upon the side intended to receive the impact of projectiles a stratum of tenacious steel of heterogeneous crystalline structure highly and uniformly carburized and excessively hard upon its exposed surface and less and less carburized and gradually diminishing in hardness as the depth from said surface increases. The required transformation is effected by inclosing the low steel plate between a mass of non-carbonaceous granular material on one side and a mass of granular carbonaceous material packed firmly against the other side in a compartment erected within the heating-chamber of a suitable furnace and in then raising the heat

of said heating-chamber and maintaining it at a temperature above the melting-point of cast-iron for a period of time sufficient to effect the desired increase in the tenacity of the steel and the supercarburization to the desired extent and depth of the side of the plate against which the granular carbonaceous material is being constantly pressed. The plate is subsequently removed from the furnace and chilled by immersion in a cold bath or otherwise, as hereinafter set forth, whereby its supercarburized side is hardened. The heat to which the plate is subjected during the described treatment is so intense that the plate would be melted but for the granular materials surrounding it, by which all parts of it are protected from the air. The continuous firm compression of the carbonaceous material against the plate during the entire treatment secures the perfect contact of the carbonaceous material with all portions of the adjacent side of the plate and promotes the rapid and uniform supercarburization thereof.

The product of the described treatment, except in respect of its crystalline structure, is a homogeneous armor-plate of highly-tenacious steel, which upon the side intended to receive the impact of projectiles presents a stratum of prescribed thickness which is decrementally carburized, and consequently has an ununiform crystalline structure, and is excessively hard at its exposed surface and gradually diminishes in hardness as the distance inward from its exposed surface increases. The differences in granulation or crystalline structure are those which are respectively incident to the different percentages of carbon present at different depths beneath the surface. The said product is herein designated as a "decrementally-hardened armor-plate," because the hardening process is the final step in its production, and because decremental hardening is dependent upon previous decremental carburization and involves the presence in the finished product of a heterogenous crystalline structure, which increases its resistance to cleavage.

The treatment is analogous to that described in Letters Patent of the United States No. 376,194, issued to H. A. Harvey January 10, 1888.

As modified for the present purpose the process is conducted as follows: The armor-plate having been formed of the desired size and shape from a comparatively low steel, such as Bessemer steel or open-hearth steel, containing, say .10 to .35 per cent. of carbon, is laid, preferably, flatwise upon a bed of finely-powdered dry clay or sand deposited upon the bottom of a fire-brick cell or compartment erected within the heating-chamber of a suitable furnace. The plate may be so embedded that its upper surface is in the same plane with the upper surface of those portions of the bed of clay or sand which adjoin the sides and ends of the plate, or the plate may, if desired, be allowed to project to a greater or less distance above the surface of the clay or sand. In either case the treating-compartment is then partially filled up with granular carbonaceous material, which, having been rammed down upon the plate, is covered with a stratum of sand, upon which there is laid a covering of heavy fire-bricks. The furnace is then raised to an intense heat, which is kept up for such period of time as may be required for the absorption by the metal adjoining the upper surface of the plate of, say, an additional one per cent. (more or less) of carbon, or, in other words, the quantity of carbon, in addition to that originally present, which may be necessary to enable the said metal to acquire the capacity of hardening to the desired degree. The temperature of the heating-chamber outside of the treating-compartment is brought up to a height equal to or above that required to melt cast-iron, and is kept *up for a greater or less* length of time, according to the depth of the

stratum of steel which it is intended to charge with an excess of carbon. This period, however, will of course vary according to the efficiency of the furnace.

The degrees of efficiency possessed by different furnaces can only be satisfactorily ascertained by actual trial. When ascertained, the reproduction of given results merely requires the re-establishment of the conditions as to time and temperature under which said results have been previously observed to be obtained. This involves merely the maintenance of the furnace at a heat sufficient to melt cast-iron for the period which by previous observation has been ascertained to be the period required for adding to the tenacity of the steel and for the supercarburization of the plate to the prescribed extent and depth. For example, a plate, say, ten and one-half inches in thickness, composed of a comparatively low steel containing, say, .35 per cent. of carbon, may be charged with additional quantities of carbon, gradually varying in amount from, say, one-tenth of one per cent. at a depth of three inches beneath the surface of the exposed side of the plate to one per cent. at the surface thereof by a continuance of the treatment for a period of, say, one hundred and twenty hours after the furnace has been raised to the required temperature.

The statement that the heat at which the furnace is maintained is sufficient to melt cast-iron is to be regarded as approximate merely. The more intense the heat the better, and while it will of course be understood that the longer the treatment is continued the greater will be the depth to which the carbon penetrates beneath the surface against which the carbonaceous material is packed, it is also to be remarked that the penetration of the carbon is greatly facilitated by the continuous firm compression of the carbonaceous material against the plate. As a general rule the thicker the armor-plate the greater will be the permissible depth of supercarburization. A ten-and-a-half-inch plate and a depth of supercarburization of three inches are herein referred to merely for the purpose of illustration. After the conclusion of the carburizing treatment the plate is taken out of the furnace, and without removal of the carbonaceous material from its surface is allowed to cool down to the proper temperature for chilling. During the cooling operation the carbonaceous material protects the hot supercarburized surface from the air, and thus prevents the formation of scale, which, if present, would interfere with the subsequent hardening of the metal beneath it. The carbonaceous material, however, may without injurious consequences be temporarily removed from and quickly replaced upon small portions of the supercarburized surface for the purpose of exposing them for observation. When it is seen that the supercarburized surface is so far cooled down as to have a dull cherry-red color, the carbonaceous material is quickly removed, and the plate is then chilled by being sprayed with torrents of cold fluid or by being submerged and kept in motion until cold in a large bodly of cooling-fluid—as, for example, a more or less rapidly-running stream or river of fresh water or a tidal current of salt water. The exercise of this precaution insures the subsequent uniform hardening of the supercarburized surface of the plate.

The accompanying drawings, symbolically illustrating a furnace suitable for the described treatment and mechanical appliances for handling the plate and for facilitating the chilling operation, are as follows:

Figure 1 is a top view of a furnace provided with a removable cover, erected *upon the bank* of a river or other body of water in suitable

proximity to a crane and to a car-track extending down the bank along the bottom of the stream or body of water, showing a car upon which the treated plate is deposited by means of the crane, a windlass-chain connected with the car, and an engine for operating the windlass, and thereby controlling the movements of the car up and down the inclined track. Fig. 2 is a side elevation, partly in section, of the plant represented in Fig. 1. Fig. 3 is a transverse vertical section of the furnace, showing the armor-plate and the cell or compartment containing the bodies of material in which the armor-plate is inclosed. Fig. 4 is a transverse section of a portion of an armor-plate shaded to symbolically represent variable degrees of supercarburization at different depths beneath the surface upon the side intended for exposure to the impact of projectiles. Fig. 5 is an elevation of a treating-furnace illustrating a mode of arranging the track so that the armor-plate can be taken out of one end of the furnace directly onto the car upon which it is supported during the chilling operation. Fig. 6 illustrates a provision for chilling the plate by spraying it with torrents of cooling-fluid, and shows a stationary platform extending from one end of the furnace to a position beneath the spraying-tank.

The drawings represent a furnace A, which may be provided with a movable cover A′, as symbolically represented in Figs. 1, 2, and 3, or which may be constructed with reference to having one or both of its end walls removed to facilitate the removal of the plate in a horizontal direction, as illustrated in Fig. 6. Within the heating-chamber A^2 of the furnace is the treating cell or compartment B, which is preferably provided at the bottom with a series *b* of parallel rails, which are embedded in a stratum of sand C of the same height as the rails and are intended for the support of the armor-plate D. The space around the ends and sides of the armor-plate is also filled with sand C′ nearly or quite to the top of the plate. A stratum of granular carbonaceous material E, rising to a height of, say, eight inches above the upper surface of the plate D, is tightly rammed down onto the top of the plate and is surmounted by a stratum of, say, two inches of sand F, covered by a layer G of heavy fire-brick. The stratum of sand F and the layer of fire-brick G not only protect the carbonaceous material from the fire, but serve to weight the carbonaceous material down upon the plate.

The treating-compartment B is heated by the flames and hot products of combustion from the fire-chamber H, which are led upward through the flues H′ and directed inward over the tops of the treating-compartment and finally discharged into the chimney or smoke-stack H^2.

In Fig. 1 the furnace is represented as erected upon the sloping bank I of a river or body of water J in suitable proximity to a crane K and a car-track L, extending down the bank and along the bottom of the body of water J. When the carburizing treatment is completed, if the furnace shown in Fig. 1 is employed, the cover A′ is removed, the fire is drawn, and the furnace allowed to cool off preparatory to the removal of the superincumbent materials from the plate D and the lifting of the plate D by means of the crane out of the treating-compartment and its deposit upon the car M. The track L is so inclined that the car when freed to the influence of gravity will run down into the water and a greater or less distance along the submerged portion L′ of the track. The car is hauled up the inclined portion L^2 of the track by means of a windlass-chain N, fastened to the shore end of the car M and wound around the drum of the windlass O, which is operated by the engine O′. The chilling of the plate is effected by *alternately hauling* the car up the inclined portion L^2 of the track and *allowing it to run* backward by its own gravity.

In dealing with a heavy plate it will usually be found more convenient to construct the furnace with reference to the removal of one or both of its end walls to facilitate the removal of the plate from the treating-furnace by sliding it in a horizontal path onto a car, as indicated in Fig. 5, or onto a platform P, which is on a level with the top of the rails *b* at the bottom of the treating-compartment, as indicated in Fig. 6. The plate having been thus deposited upon the car, the latter can be run down into the water, as already described, or can be run under a spraying-tank Q, or the platform P may be prolonged sufficiently to reach from the end of the furnace to a position beneath the spraying-tank, as illustrated in Fig. 6. The spraying-tank has a perforated bottom *q*, which is elevated, say, ten feet above the platform on which the plate is supported. The tank is supplied with water or other liquid by a service pipe or pipes Q′ of sufficient capacity to supply a quantity greater than the quantity discharged by the apertures in bottom *q* thereof. After the carbonaceous material has been removed from the top of the plate and when the plate, having been placed beneath the spraying-tank, has so far cooled down as to have a dull-red color, the tank is supplied with the cooling-fluid, which is discharged therefrom in jets from the perforated bottom directly upon the plate.

With a furnace of the character shown in the drawings a period of about forty-eight hours will be required to bring up the heat to the required point, and such heat will be required to be kept up about one hundred and twenty hours. A further period of four or five hours will ordinarily be required after the fire has been drawn to remove the plate from the furnace and have it cool down to the desired dull-red color. The spraying operation will be required to be continuously kept up for a period of about four hours in order to effect and preserve the chilling of the supercarburized surface until the remainder of the plate has become completely cool. A plate of ten and a half inches in thickness thus treated will be found to be excessively hardened upon its supercarburized surface and at the same time to be remarkably tenacious, so that a hardened projectile of, say, six inches diameter, weighing one hundred pounds, fired at it with a striking velocity of two thousand feet per second will be shivered to fragments without deeply penetrating the plate. The extreme point of the projectile, which may slightly penetrate the plate, will be found to be welded thereto by the great heat resulting from the sudden stoppage of the projectile in its flight.

Owing to the great tenacity and the heterogeneous crystalline structure of the supercarburized and hardened stratum, its tough backing, and the entire homogeneity of the plate from one surface to the other, except as to its crystalline structure, there will be no cracking off of the hardened exterior stratum and no complete piercing of the plate by the projectile. In these particulars the plate will be found to differ in a marked degree from all armor-plates heretofore known.

What is claimed as the invention is—

1. The herein-described method of producing a decrementally-hardened tenacious armor-plate, which consists in inclosing a low steel plate between a mass of non-carbonaceous material on one side and a mass of granular carbonaceous material firmly packed upon the other side contained in a compartment formed within the heating-chamber of a suitable furnace and in maintaining the said heating-chamber for a predetermined period of time at a temperature above the melting-point of cast-iron, and in subsequently chilling said plate, whereby a stratum of steel *of prescribed thickness* upon the side of the plate against which

said carbonaceous material has been pressed is made to acquire a heterogeneous crystalline structure and a condition of excessive hardness upon its exposed surface and a condition of gradually-diminishing hardness as the depth from said surface increases.

2. As a product of the herein-described process, the decrementally-hardened steel armor-plate herein described, consisting of a plate of tenacious steel presenting upon the side intended for receiving the impact of projectiles a stratum of prescribed thickness of ununiform crystalline structure uniformly and highly supercarburized and excessively hard at its exposed surface and less and less carburized and gradually diminishing in hardness as the depth from said surface increases.

HAYWARD A. HARVEY.

Witnesses:
A. M. JONES,
J. E. BURNS.

Senator CHANDLER. Have you an abstract of title to this patent?

Mr. STAUFFER. I have.

Senator CHANDLER. What does the abstract show as to the ownership of the patent?

Mr. STAUFFER. It shows that the patent was assigned October 7, 1891, and recorded October 9, 1891. It was assigned to the Harvey Steel Company, of Newark, N. J., by Hayward A. Harvey, the inventor.

The abstract of title referred to is as follows:

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing, found of record up to and including February 26, 1896, under or relating to letters patent granted to Hayward A. Harvey, Orange, N. J., September 29, 1891, No. 460262, "Decrementally hardened armor plate."

In testimony whereof, I John S. Seymour, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-eighth day of February, in the year of our Lord one thousand eight hundred and ninety-six, and of the Independence of the United States of America the one hundred and twentieth.

[SEAL.] JOHN S. SEYMOUR, *Commissioner.*

[United States Patent Office. Copy made February 28, 1896.]

Assignor.	Assignee.	Date of assignment.	Date of record.
Hayward A. Harvey.....	Harvey Steel Company, Newark, N. J.	Oct. 7, 1891	Oct. 9, 1891

Invention.	Territory assigned.	Liber.	Page.
Decrementally hardened armor plate, Sept. 29, 1891, 460262.	The whole right, title, and interest in said improvement and letters patent to the end of the term for which they are or may be granted, $1 and other considerations.	C 45 ..	291

Senator CHANDLER. Now, state the history of that patent, beginning with the date of application, and all the material facts that appear.

Mr. STAUFFER. The application was filed April 1, 1891, Serial No. *387209.*

The claims of this application were rejected upon several references, and in accordance with the law and the practice of the office that rejection was repeated. The said claims were then what is called "finally" rejected.

The claims were appealed by the applicant to the board of examiners in chief in the manner prescribed by law, and were allowed on such appeal by the board.

I have a copy of the examiner's statement and of the decision of the board of examiners in chief on appeal.

Senator CHANDLER. What were the various stages of that proceeding and what was the final result?

Mr. STAUFFER. There was only one stage as to the appeal itself. The case was simply appealed to the board of examiners in chief, and the claims were allowed by them on appeal. The application was then passed to issue by the examiner in charge.

Senator CHANDLER. State what was appealed from.

Mr. STAUFFER. The final rejection of the claims by the primary examiner.

Senator CHANDLER. State historically what those rejections were.

Mr. STAUFFER. The rejections historically in order would be, first, a rejection——

Senator CHANDLER. I should like to know who made the rejection.

Mr. STAUFFER. The rejection was made by the primary examiner.

Senator CHANDLER. Is his name given in the copy of the papers which you have?

Mr. STAUFFER. It is not. But the examiner at that time was Mr. Eugene Byrnes.

Senator CHANDLER. The claims were rejected by Mr. Byrnes and they were appealed to what board?

Mr. STAUFFER. The application was first rejected by Mr. Byrnes, then it was reconsidered on request by the applicant and again rejected, the second rejection being what is technically termed in the office a final rejection. Then an appeal was taken to the board of examiners in chief.

Senator CHANDLER. State who they were.

Mr. STAUFFER. The board of examiners in chief at that time consisted of three members, Mr. R. L. B. Clarke, Mr. S. W. Stocking, and Mr. H. H. Bates. However, but two members of the board were present at the hearing, Messrs Clarke and Stocking.

Senator CHANDLER. Have you a paper prepared which shows the details of those proceedings?

Mr. STAUFFER. I have a paper here which shows the brief of the applicant on appeal, the examiner's statement of his reasons for rejection, and the decision of the board on the claims.

Senator CHANDLER. Which resulted in the issue of the patent by the Commissioner?

Mr. STAUFFER. Yes, sir; which resulted in the issuance of the patent by the Commissioner.

The paper referred to is as follows:

No. 14624. U. S. PATENT OFFICE, *July 14, 1891.*

Before the examiners in chief, on appeal.

Application of Hayward A. Harvey for a patent for an improvement in decrementally hardened armor plates and method of manufacturing the same, filed April 1, 1891. Serial No. 387209.

Mr. E. E. *Quimby for* appellant.

The claims appealed are:

1. The herein described method of producing a decrementally hardened tenacious armor plate, which consists in enclosing a low steel plate between a mass of noncarbonaceous material on one side and a mass of granular carbonaceous material firmly packed upon the other side, contained in a compartment formed within the heating chamber for a predetermined period of time at a temperature above the melting point of cast iron, and in subsequently chilling said plate, whereby a stratum of steel of a prescribed thickness upon the side of the plate against which said carbonaceous material has been pressed is made to acquire a heterogeneous crystalline structure, and a condition of excessive hardness upon its exposed surface, and a condition of gradually diminishing hardness as the depth from said surface increases.

2. The decrementally hardened steel armor plate herein described, consisting of a plate of tenacious steel presenting upon the side intended for receiving the impact of projectiles a stratum of prescribed thickness of uniform chrystalline structure uniformly and highly supercarburized and excessively hard at its exposed surface, and less and less carburized and gradually diminishing in hardness as the depth from said surface increases.

The references are patents to Sperry, February 2, 1869, No. 86467; MacDonald, May 11, 1869, No. 89876; Harvey, January 10, 1888, No. 376194; British patents, Nos. 1026, of 1877; 14473, of 1889.

The process is not anticipated.

Applicant's own patent is for a process of treating ingots, etc., of low steel for the purpose of rendering the steel suitable for tempering for tools and cutlery, etc. He has now been experimenting on steel armor plates, and sets forth that though his mode of treatment is analogous, yet he has varied it by adding the features of noncarbonaceous material on one side of the plate and packing the granular carbonaceous material on the other, etc., and other steps set forth and peculiarly adapted to the material to be operated upon and produced.

By following out this clearly defined process set forth in his first claim, he sets forth in this specification that he secures the product covered by the second claim, and that—

A plate of ten and a half inches in thickness thus treated will be found to be excessively hardened upon its super-carburized surface, and at the same time to be remarkably tenacious, so that a hardened projectile of, say, six inches diameter, weighing one hundred pounds, fired at it with a striking velocity of 2,000 feet per second will be shivered to fragments without deeply penetrating the plate.

The extreme point of the projectile, which may slightly penetrate the plate, will be found to be welded thereto by the great heat resulting from the sudden stoppage of the projectile in its flight.

Owing to the great tenacity and the heterogenous crystalline structure of the supercarburized and hardened stratum, its tough backing, and the entire homogeneity of the plate from one surface to the other, except as to its crystalline structure, there will be no cracking off of the hardened exterior stratum, and no complete piercing of the plate by the projectile. In these particulars, the plate will be found to differ in a marked degree from all armor plates heretofore known.

This is not questioned, and, indeed, the fact that applicant has accomplished this very desirable result by and through this process is satisfactorily established by other proofs submitted outside this record.

We can not say that an equally good result could be secured by deviating from the steps and proceedings set forth in the first claim, either in changing temperature or omitting the noncarbonaceous material on one side of the plate, or the packing of the carbon on the other, or changing the method in any other particular.

If it can it is open to the public, and this claim, if patented, would be no embarrassment in the art.

As to the second claim, the words "as a product of above process" should be inserted as a commencement.

We observe that a clerical error appears in the 4th line of this claim, as stated by the examiner; the word "uniform" should be "ununiform."

With above suggestions as to the 2nd claim, the decision is reversed.

R. L. B. CLARKE,
S. W. STOCKING,
Examiners in Chief.

(Third member absent.)

(Indorsed:) No. 14624. Serial No. 387209. Paper No. 4. Decision filed July 14, 1891. H. A. Harvey. Examiners in chief, July 14, 1891, U. S. Patent Office. Recorded vol. 41, p. 483.

UNITED STATES PATENT OFFICE.

In re application ser. No. 387209. Hayward A. Harvey, decrementally hardened armor plates and method of manufacturing the same. Filed April 1, 1891. Before the examiners in chief by appeal.

EXAMINER'S STATEMENT.

DIVISION 3, *June 22, 1891.*

The claims a second time rejected are:

1. The herein-described method of producing a decrementally hardened, tenacious armor plate, which consists in inclosing a low steel plate between a mass of non-carbonaceous material on one side and a mass of granular carbonaceous material firmly packed upon the other side, contained in a compartment formed within the heating chamber of a suitable furnace and in maintaining the said heating chamber for a predetermined period of time at a temperature above the melting point of cast iron, and in subsequently chilling said plate, whereby a stratum of steel of prescribed thickness upon the side of the plate against which said carbonaceous material has been pressed is made to acquire a heterogenous crystalline structure, and a condition of excessive hardness upon its exposed surface, and a condition of gradually diminishing hardness as the depth from said surface increases.

2. The decrementally hardened steel armor plate herein described, consisting of a plate of tenaceous steel presenting upon the side intended for receiving the impact of projectiles a stratum of prescribed thickness, of uniform crystalline structure, uniformly and highly super-carburized and excessively hard at its exposed surface, and less and less carburized and gradually diminishing in hardness as the depth from said surface increases.

The references cited are: United States patents, 86467, February 2, 1869, Sperry (C. & C. H. compounds); 89876, May 11, 1869, MacDonald (C. & C. H. compounds); 376194, January 10, Harvey (C. & C. H. compounds).

British patents: Howell, 14473 of 1889 (C. & C. H., Has); Wilson, 1026 of 1877 (A. & T., decarbonizing).

It is held that there is no invention in adding to the carburizing process disclosed by Harvey and MacDonald, the well-known step of hardening by chilling, employed by Sperry and Howell.

As to the limitation of claim 1, that the temperature shall be maintained at a temperature above the melting point of cast iron, it is held that the use of the proper temperature to effect the desired depth of carburization is merely the exercise of the expected skill of the metal worker. It is well known that an increased temperature causes carbon to penetrate to a greater depth, and a greater percentage thereof to be taken *up by the iron* Furthermore, this applicant, in patent No.

376194, referred to in this application, describes and claims a process in which a temperature above that of molten cast iron is employed.

EUGENE BYRNES,
Examiner, Division 3.

(Indorsed:) No. 14624. Serial No. 387209. Paper No. 2. Examiner's statement filed June 24, 1891. H. A. Harvey. Examiners in chief, June 24, 1891, U. S. Patent Office.

Hon. C. E. MITCHELL,
Commissioner of Patents.

DEAR SIR: I hereby appeal to the examiners in chief from the decision of the principal examiner in the matter of H. A. Harvey's application for letters patent for certain improvements in decrementally hardened armor plate and in the art of manufacturing the same, serially numbered 387209, filed April 1, 1891, and formally rejected a second time on June 11, 1891.

In his final letter the primary examiner suggested a slight formal amendment of the first claim, which suggestion is not adopted, because there does not seem to be any necessity for it.

I file herewith for the convenience of the board an amendment in the form of a substitute specification, which is simply a copy of the specification as it stands after the proper insertions of the amendments heretofore made.

Upon this appeal I desire to be heard in person, and at as early a day as circumstances may render possible.

The claims are as follows:

1. The herein-described method of producing a decrementally hardened tenacious armor plate, which consists in inclosing a low steel plate between a mass of noncarbonaceous material on one side and a mass of granular carbonaceous material firmly packed upon the other side, contained in a compartment formed within the heating chamber of a suitable furnace, and in maintaining the said heating chamber for a predetermined period of time at a temperature above the melting point of cast iron, and in subsequently chilling said plate, whereby a stratum of steel of prescribed thickness upon the side of the plate against which said carbonaceous material has been pressed is made to acquire a heterogeneous crystalline structure, and a condition of excessive hardness upon its exposed surface, and a condition of gradually diminishing hardness as the depth from said surface increases.

2. The decrementally hardened steel armor plate herein described, consisting of a plate of tenacious steel presenting upon the side intended for receiving the impact of projectiles a stratum of prescribed thickness, of ununiform crystalline structure uniformly and highly supercarburized and excessively hard at its exposed surface, and less and less carburized and gradually diminishing in hardness as the depth from said surface increases.

This appeal is based upon the ground that upon the record as it stands applicant is entitled to have the above set forth claims allowed. The facts in support of this contention are as follows:

In his letter of May 14, 1891, the primary examiner first criticised a novel form of expression employed in the specification and suggested the substitution of some other expression therefor, which suggestion was subsequently replied to on behalf of applicant; secondly, the examiner required an amendment of the first claim, which amendment *was subsequently* made; thirdly, he rejected the claims on "each of" *five prior patents*, relating respectively to different subjects.

And after reciting those patents the examiner then concluded his letter with the following sentence:

"There is no invention in adding to the carburizing process disclosed by Harvey and McDonald the well-known step of hardening by chilling employed by Sperry and Howell."

On May 21, 1891, some amendments, including that required by the office, were duly filed, and accompanying these amendments there was filed the argument of May 21, 1891.

In the said argument the examiner's criticism of the expression "decrementally hardened armor plate" was discussed, and the reasons for the use of that expression fully explained.

The examiner's letter was analyzed, some inconsistencies in it were pointed out, and the conclusion was drawn that the examiner's position was, not that applicant's invention is anticipated by each of the recited prior patents, but that the prior patents taken together disclose all that applicant's specification discloses.

Practically, the examiner was challenged to point out, if he could, any one prior patent in which the invention is fully disclosed. In the said argument every one of the prior patents cited was discussed in detail, and it was pointed out that the total information contained in the patents cited is not sufficient to enable the public to practice applicant's invention.

It was pointed out that judicial notice may be taken of the fact that for many years all the principal civilized nations of the world, with the aid of practically unlimited means and under the spur of intense rivalry have been engaged in the endeavor to produce impierceable armor plate, and that such plates never were produced until applicant's invention was put into practice.

The argument also embraced the offer of proof of the assertions made in it.

The examiner's only reply to the argument of May 21, 1891, is contained in the following sentence of his letter of June 11, 1891, which is as follows, to wit:

"The claims are a second time rejected on the references of record."

That is to say, the examiner does not take up the challenge which was given him in the argument of May 21, to cite any one prior patent disclosing applicant's invention; he makes no reply to the discussion in detail of the prior patents by which it is shown that, taken all together, they do not disclose applicant's invention; he takes no notice of the salient fact that applicant's invention has effected a startling revolution in the art which has attracted the interest of the civilized world, and he has no reply to make to the comment that he has "viewed the prior patents in the light afforded by the present application," and that that, in the absence of that light, the total information contained in them did not, as a matter of fact, lead to the production by the public of applicant's decrementally hardened and consequently impierceable armor plate, notwithstanding the eager efforts of rival nations and governments to accomplish the result which applicant has now accomplished.

Upon this state of facts, uncontroverted by the examiner, I contend that the application should be allowed.

EDW. E. QUIMBY, *Attorney.*

NEW YORK, *June 16, 1891.*

(Indorsed:) No. 14624, serial No. 387209, paper No. 1. Reasons of appeal filed June 17, 1891. H. A. Harvey. U. S. Patent Office, June 17, 1891, chief clerk. Examiners in chief, June 24, 1891, U. S. Patent Office.

Senator CHANDLER. Summarize briefly the reasons which were given for the rejection and those which were given for finally allowing the patent.

Mr. STAUFFER. Those reasons are more a matter of opinion than of fact. The circumstances to be considered in each case were the same. The references upon which the primary examiner rejected the claims of the application and the references in view of which the board allowed the claims are the same. It is merely a difference of opinion, the board holding them allowable and the primary examiner holding that they were not allowable.

Senator CHANDLER. State succinctly what the controversy was; as to whether it was a novel invention, whether prior inventions were considered, and if so, what inventions. And give us, as well as you can in a few words, a statement of the differences which, however, finally resulted in the issue of the patent.

Mr. STAUFFER. I can hardly do that in a very few words without reading the paper.

Senator CHANDLER. Read as much as it is necessary to give your own view. First state, if you please, whether other specific patented inventions were examined and are treated of in the discussion.

Mr. STAUFFER. That is the fact.

Senator CHANDLER. State whose patents they were.

Mr. STAUFFER. The references are patents as follows: Sperry, February 2, 1869; MacDonald, May 11, 1869, and Harvey, January 10, 1888, the Harvey patent being the one we have just considered, and certain British patents—one to Howell and one to Wilson. The British references are, in brief, as follows:

[British, 14473. September 13, 1889. Howell, jr., "Improvements in and apparatus for the manufacture of soft-back steel."]

Howell takes plates or flat bars of low carbon or soft steel in pairs of equal size and places them back to back, with a film of clay or other refractory material interlaid between them. He clamps the two plates or bars together and places them, surrounded on all sides by granulated charcoal, in an air-tight receptacle within the muffle of a furnace. The receptacle is provided with an inlet and outlet connection, to allow the full circulation of the hydrocarbon gases, which are caused to circulate through the receptacle. The heat is then kept up to a cherry red until the metal has taken up sufficient carbon, when the receptacle is allowed to cool down. When cooled, the plates are taken out and forged, hardened, and tempered in the usual known way.

[British, 1026. Mch. 14, 1877. Wilson, "Armour plates."]

Wilson takes an armor plate either cast or wrought, and containing any desired proportion of carbon, and decarbonizes one face of a plate, say 20 inches thick, to a depth of 8 inches leaving the remaining 12 inches unchanged.

He takes a cast-iron box and covers the bottom with charcoal and on this places the steel plate which has been previously coated with black lead on its underside and up its edges to a height of 12 inches, or the depth he desires to keep the plate unchanged.

On the top of the plate and around its edges to a depth of 8 inches he applies oxide of iron or other decarbonizing agent. A cover is then put on the box and the whole run into a furnace and kept at the desired temperature for the required length of time to decarbonize the upper *face to the required* 8 inches.

He then allows the oven to cool down gradually and then removes the the armor plate.

Senator CHANDLER. How many patents, other than the Harvey patent, were considered?

Mr. STAUFFER. Four patents besides the one to Harvey himself were considered.

It is held that there is no invention in adding to the carburizing process disclosed by Harvey and MacDonald, the well-known step of hardening by chilling, employed by Sperry and Howell.

As to the limitation of claim 1, that the temperature shall be maintained at a temperature above the melting point of cast iron, it is held that the use of the proper temperature to effect the desired depth of carburization is merely the exercise of the expected skill of the metal worker. It is well known that an increased temperature causes carbon to penetrate to a greater depth, and a greater percentage thereof to be taken up by the iron. Furthermore, this applicant, in patent No. 376194——

Being the patent of which we have been speaking—

referred to in this application, describes and claims a process in which a temperature above that of molten cast iron is employed.

Senator CHANDLER. From what have you been reading?

Mr. STAUFFER. From Mr. Byrnes.

Senator CHANDLER. The primary examiner who disallowed the claims?

Mr. STAUFFER. The primary examiner who rejected the claims. Then follows a brief of the argument of the attorney in the case, Mr. E. E. Quimby.

Senator CHANDLER. Now give, if you can, the point of the decision overruling Mr. Byrnes's rejection and recommending the issuance of the patent.

Mr. STAUFFER. The board in overruling the action of the examiner said:

Applicant's own patent is for a process of treating ingots, etc., of low steel for the purpose of rendering the steel suitable for tempering for tools and cutlery, etc. He has now been experimenting on steel armor plates, and sets forth that though his mode of treatment is analogous, yet he has varied it by adding the features of noncarbonaceous material on one side of the plate and packing the granular carbonaceous material on the other, etc., and other steps set forth and peculiarly adapted to the material to be operated upon and produced.

By following out this clearly defined process set forth in his first claim, he sets forth in this specification that he secures the product covered by the second claim,

And that materially improved results follow as to the depth of penetration of the carbon and as to the completeness of the hardening itself.

We can not say that an equally good result could be secured by deviating from the steps and proceedings set forth in the first claim, either in changing temperature or omitting the noncarbonaceous material on one side of the plate, or the packing of the carbon on the other, or changing the method in any other particular.

If it can—

That is, if this series of steps can be changed—

it is open to the public, and this claim, if patented, would be no embarrassment in the art.

That is the consideration of the first claim, and the second claim goes with the first.

Senator CHANDLER. State in a word, if you can, for what novelty or new process *the patent* was finally granted. Was it for the particular

method of hardening described, a particular metallurgical process adopted in hardening steel?

Mr. STAUFFER. A particular set of steps; a particular succession of steps would be a better way to term it. Those steps themselves were known before, but the board allowed the patent on the ground that that particular sequence or succession had not been known before, and apparently resulted in an improved product.

Senator CHANDLER. A useful invention?

Mr. STAUFFER. A useful invention.

Senator CHANDLER. And that, you think, is as briefly as can be stated the reason why the patent was granted?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. What evidence was on file in the Patent Office at that time, or is now there, upon which those various arguments were made?

Mr. STAUFFER. The appeal file in the case.

Senator CHANDLER. There was the original application.

Mr. STAUFFER. There was the original application, but what I last read is taken from the appeal file.

Senator CHANDLER. What does the appeal file contain in the way of evidence?

Mr. STAUFFER. It contains the reasons for the appeal, the examiner's statement of his grounds for rejection, the attorney's brief on appeal, and the decision of the board of examiners in chief.

Senator CHANDLER. What was the evidence before the examiner as to what had been invented?

Mr. STAUFFER. The evidence is found——

Senator CHANDLER. Was it in machines or was everything on paper?

Mr. STAUFFER. Everything was on paper. The patents I have referred to constitute the only evidence.

Senator CHANDLER. Descriptions of processes in connection with prior patents?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. What evidence was there that Harvey had made the invention?

Mr. STAUFFER. None.

Senator CHANDLER. None except his own statement?

Mr. STAUFFER. None save his own statement.

Senator CHANDLER. Taking in connection other patents with which his application was compared?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. Did it appear, so far as the record shows, that any experiments had been made by Harvey at that time?

Mr. STAUFFER. There is nothing in the record to show that.

Senator CHANDLER. Do you find in the record evidence that while the appeal was pending or before——

Mr. STAUFFER. I beg pardon, Senator. It was a mistake on my part to say that there is nothing in the record to show that experiments had been made. There were filed during the appeal certain statements of which I have a brief here. Shall I read it?

Senator CHANDLER. If you have a short statement.

Mr. STAUFFER. The statement is as follows:

A plate of 10½ inches in thickness thus treated will be found to be excessively hardened upon its supercarburized surface and at the same time to be remarkably *tenacious, so that* a hardened projectile of, say, 6 inches diameter, weighing 100 *pounds, fired at it with* a striking velocity of 2,000 feet per second will be shivered *to fragments without* deeply penetrating the plate.

And in another paragraph it is said:

The extreme point of the projectile, which may slightly penetrate the plate, will be found to be welded thereto by the great heat resulting from the sudden stoppage of the projectile in its flight.

Owing to the great tenacity and the heterogeneous crystalline structure of the supercarburized and hardened stratum, its tough backing and the entire homogeneity of the plate from one surface to the other, except as to its crystalline structure, there will be no cracking off of the hardened exterior stratum, and no complete piercing of the plate by the projectile.

Senator CHANDLER. Did it appear that those experiments had actually been made?

Mr. STAUFFER. I can not say positively as to that point. I can merely infer from that statement.

Senator CHANDLER. Would you infer from that statement, as to what would be the result under certain conditions, that the experiment had been actually made; that it was a fact and not a theory?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. At what stage in the proceedings which you have been narrating was a letter received from the Secretary of the Navy requesting that the patent be expedited under the rule?

Mr. STAUFFER. That I can not say. I am instructed by the Commissioner of Patents to say that these are not complete records of the files, but that if the committee wish complete records they can be furnished, although there is a mass of papers which probably would not be at all useful, and the Commissioner thought it better simply to send what I have brought with me.

Senator CHANDLER. The course which the Commissioner has pursued is preferable, because we can ask for anything additional if we want it.

Mr. STAUFFER. The question with regard to the Secretary of the Navy would, of course, be evident from an inspection of the files.

Senator CHANDLER. Now, please proceed with the history of the Harvey patents.

Mr. STAUFFER. The next is a patent granted by the United States to Hayward A. Harvey, of Orange, N. J., assignor to the Harvey Steel Company, of New York City and Newark, N. J., for a composition for supercarburizing steel, etc., being patent No. 498390, dated May 30, 1893, granted upon application filed January 28, 1893, serial No. 460155. This patent was granted for the use of the particular composition in treating steel during the process of carburizing, the particular composition being wood charcoal and animal charcoal finely ground and mixed.

Senator CHANDLER. Have you a copy of the patent?

Mr. STAUFFER. I have an official copy of the patent, but I am instructed to say that arrangements have been made to send a copy. When I left this morning I was not able to procure any but the official copy, and the Commissioner desires to have it returned.

Senator CHANDLER. Then you will furnish a copy?

Mr. STAUFFER. Yes, sir.

The patent referred to is as follows:

Hayward A. Harvey, assor. to the Harvey Steel Company, of New York, N. Y., and of Newark, N. J. Improvement in composition for supercarbonizing steel, &c. Specification forming part of Letters Patent No. 498390. Dated May 30th, 1893.

SPECIFICATION.

To all whom it may concern:

Be it *known that* Hayward A. Harvey, of Orange, New Jersey, has *invented a certain improvement* in compositions for supercarburizing

steel during the subjection of the same to high temperatures, of which the following is a specification:

This improvement relates to the composition of the body of carbonaceous material employed for supercarburizing steel in the process of treating low steel, described in United States Letters Patent No. 376194, issued to Hayward A. Harvey, January 10, 1888, and also during the process of manufacturing decrementally hardened armor plate, described in United States Letters Patent No. 460262, issued to Hayward A. Harvey, September 29, 1891. In said processes, in which the steel under treatment is subjected to intense heat, it is essential to completely exclude oxygen from the heated metal, and charcoal in the form of fine powder is the best material for the carbonaceous body.

Several objections have heretofore been experienced in such use of finely powdered charcoal. It has been found necessary to deeply embed in the powdered charcoal the metal to be treated because of the tendency of masses of powdered charcoal to subsidence when heated. This has involved the employment of treating chambers of undesirably large vertical dimensions and a corresponding increase in the height of the furnace chambers. Another difficulty has arisen from the tendency of the finely powdered charcoal to fly off in dust when stirred or moved from place to place as it has to be when loading and unloading the treating chamber.

It is also the fact that for some reason, the nature of which is not fully understood, when fine wood charcoal alone is used and is subjected to high heat, explosions occasionally occur. These explosions are forcible enough to blow off the cover of a closed receptacle, or, if the receptacle containing the fine charcoal is not closed and the charcoal is covered with a layer of sand and a superposed layer of fire brick, as described in letters patent of the United States No. 460262, a species of ebullition is observed to take place in the granular mass by which the mass is loosened so as to diminish the firmness of its compression against the steel which is to be supercarburized.

These difficulties are practically overcome by the present invention, which consists in forming the carbonaceous body, which for present convenience may be called the treating bed, partly of finely powdered wood charcoal and partly of animal charcoal, preferably the so-called "spent char," from sugar refineries. The specific gravity of animal charcoal is nearly four times that of wood charcoal, and it is found that the presence of the animal charcoal lessens the extent of subsidence of the compressed mass of carbonaceous material when heated, diminishes the tendency of the finely powdered wood charcoal to fly off in dust when the mixture is handled, either in the act of filling the chamber in which the heating operation is carried on, or in the act of emptying the said chamber preparatory to, or in connection with, the removal of the metal from the treating bed, and prevents the occurrence of the explosions referred to, by which the mass of treating material is mechanically disturbed.

The proportion of animal charcoal employed is not absolute. Ten or 15 per cent causes an observable diminution in the quantity of dust arising under the circumstances referred to, and 40 to 50 per cent almost entirely prevents the escape of dust.

The finely powdered wood charcoal occupies the interstices between the particles of animal charcoal. During the handling of the mixture the animal charcoal acts as a carrier for the finely powdered wood charcoal, and also acts as a shield, which to a greater or less extent prevents the finely powdered wood charcoal or charcoal dust from escaping into the atmosphere.

Owing to the inclusion in it of animal charcoal, the material of the treating bed is valuable for manufacture into fertilizers, for which purpose it can be readily sold after repeated use has caused it to part with its carbon to such an extent as to impair its effectiveness for the purposes herein mentioned.

What is claimed as the invention is—

The herein described treating bed for effecting the supercarburization of steel during the subjection of the same to high temperature, the same consisting of a mixture of finely powdered wood charcoal with animal charcoal, as and for the purposes set forth.

HAYWARD A. HARVEY.

Witnesses:
E. GATTERER.
A. M. JONES.

Senator CHANDLER. Have you a copy of the abstract of title to that patent, showing the transfer?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. What does it show?

Mr. STAUFFER. The application upon which the patent was granted was assigned, before the patent was granted, to the Harvey Steel Company, a corporation of Newark, N. J., and New York City, N. Y., April 6, 1893, recorded April 11, 1893, for the exclusive right to said invention, to issue to said assignee, the consideration being $1 and other considerations.

Senator CHANDLER. And the present title appears to be in the Harvey Steel Company?

Mr. STAUFFER. Yes, sir.

The abstract of title referred to is as follows:

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing, found of record up to and including February 26, 1896, under or relating to letters patent granted to Hayward A. Harvey, Orange, N. J., assignor to the Harvey Steel Company, New York, N. Y., and Newark, N. J., May 30, 1893. No. 498390. "Composition for supercarburizing steel, &c."

In testimony whereof I, John S. Seymour, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-eighth day of February, in the year of our Lord one thousand eight hundred and ninety-six, and of the independence of the United States of America the one hundred and twentieth.

[SEAL.] JOHN S. SEYMOUR, *Commissioner.*

[United States Patent Office. Copy made February 28, 1896.]

Assignors.	Assignees.	Date of assignment.	Date of record.
Hayward A. Harvey.	Harvey Steel Company, corporation of New Jersey, Newark, N. J., and New York, N. Y.	Apr. 6, 1893	Apr. 11, 1893

Assignors.	Invention.	Territory assigned.	Liber.	Page.
Hayward A. Harvey.	Compositions for supercarburizing steel during the subjection of the same to high temperatures; filed Jan. 28, '93. S. *No. 460155.* May 30, '93, 498390.	Exclusive right to said invention. Patent to issue to said assignee. $1 and other considerations.	C 47	464

Senator CHANDLER. Were there any interferences in the case of this patent, or any comparison of the invention with other prior inventions?

Mr. STAUFFER. No, sir; it does not so appear.

Senator CHANDLER. Have you any further patents to Harvey?

Mr. STAUFFER. No, sir.

Senator CHANDLER. This completes, then, as far as you are prepared to reply, the history of the patents for the Harvey processes.

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. I understand from you that there are a mass of papers connected with the case.

Mr. STAUFFER. There are quite a number.

Senator CHANDLER. They are on the files of the Patent Office?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. Have you any knowledge, from the records of the Department, I mean, of any litigation in connection with these patents?

Mr. STAUFFER. No, sir.

Senator CHANDLER. Is there anything in the records of the Patent Office, to your knowledge, placed there since the patents were granted, to impeach their validity?

Mr. STAUFFER. Nothing that I know of.

Senator CHANDLER. If there are proceedings in court they do not naturally come upon the records of the Patent Office in any form.

Mr. STAUFFER. No, sir; only to the extent of sometimes requiring a transcript of the record in a particular case, and that would not be known to the examiners.

Senator CHANDLER. So far as you know you have given everything material to be known in this connection?

Mr. STAUFFER. So far as I know.

Senator CHANDLER. Relating to the history of the Harvey patents?

Mr. STAUFFER. Yes, sir.

THE COREY PATENTS.

Senator CHANDLER. Next you may take up the patents for reforging armor plate after it has been Harveyized.

Mr. STAUFFER. I have no such patents. I have some other patents here which relate to the alloys of steel and nickel, but I have not any patents for reforging.

Senator CHANDLER. The patent to which I refer especially was issued to W. E. Corey for the manufacture of carbonized steel.

Mr. STAUFFER. I have that patent.

This is a patent granted to William Ellis Corey, of Munhall, Pa., assignor to the Carnegie Steel Company, Limited, of Allegheny County, Pa. The patent is for steel armor plate and process of making same, being letters patent No. 541594, dated June 25, 1895, upon application filed June 5, 1895, the serial number being 551704.

Senator CHANDLER. Describe the process briefly and give the assignments of the patent, if any have been made beside the one you have named.

Mr. STAUFFER. The invention consists in carburizing the face of the plate at such a temperature that the surface of the plate becomes supercarburized, while the body of the plate is converted into a coarse crystalline and somewhat brittle condition. The temperature referred to is at first about 1,950° F. This is gradually raised during a period of *ten days to about 2,175°* F. The temperature is then gradually lowered

to about 1,600° F., when the plate is subjected to extreme and forcible compression, thereby compacting the metal without substantially elongating or spreading it. The plate is afterwards annealed and shaped.

Senator CHANDLER. State if you can, please, the novelty that was patented.

Mr. STAUFFER. The novelty consists in carburizing the face of the plate, during which operation the body of the plate becomes coarsely crystallized and then, at a temperature not high enough to permit elongation of the plate, compressing it.

Senator CHANDLER. Is it, then, a patent for compressing, by hydraulic pressure, a plate at a particular degree of tempereture—is that the novelty?

Mr. STAUFFER. Yes, sir; a plate between certain particular degrees of temperature.

Senator CHANDLER. Do you regard as the novelty for which the patent is granted the maintenance of that temperature between those two limits?

Mr. STAUFFER. I regard it as a patent for the treatment of a plate which, during carburizing, has been made to certain crystalline characteristics, which consists in compacting or compressing such plate at or between certain temperatures.

Senator CHANDLER. But compressing soft steel is not a novelty?

Mr. STAUFFER. No, sir.

Senator CHANDLER. Then, was this patent merely granted for the novelty of compressing the metal when it is of a heat between these two degrees of temperature?

Mr. STAUFFER. Yes, sir; when the body of the plate has been injured by the process of supercarburizing the face.

Senator CHANDLER. Is that patentable?

Mr. STAUFFER. We regarded it as patentable.

Senator CHANDLER. Will you state what was the useful purpose, the utility to be accomplished, according to the patent?

Mr. STAUFFER. I can do that best by reading from the patent.

By the use of my invention I produce steel having an unusual degree of toughness and strength, combined with extreme hardness, which is specially adapted to the manufacture of armor plates for vessels, and to other purposes for which the characteristics of great toughness and strength with extreme hardness are desired.

Senator CHANDLER. Is there any reference in the patent to armor especially?

Mr. STAUFFER. It says, "which is specially adapted to the manufacture of armor plates for vessels."

Senator CHANDLER. Is there any reference to the prior treatment of such armor before being subjected to the new process? Is the patent process applicable to all metals, or only to metals previously treated for armor?

Mr. STAUFFER. I think it applies only to metals previously treated for armor. I arrive at that opinion from this paragraph:

Armor plates are usually of an average size of 16 feet in length, 8 feet in width, and from 14 to 18 inches in thickness, and supercarbonized or hardened on one side or surface only; the hardening effect in such case gradually decreasing from the supercarbonized surface toward the other side, as the necessary result of applying the carbon to one side only. My invention, however, applies to plates, slabs, or ingots of steel hardened on both or all sides. I have stated the dimensions for the reason that, in describing the process so as to be intelligible to others skilled in the art, it is desirable to indicate the size of the articles to the treatment of which the temperatures and length of time used in the several steps are applicable.

Senator CHANDLER. Is the patent confined to a process to be applied

to armor already hardened? Is it in any way limited to such previously hardened armor?

Mr. STAUFFER. No, sir; the claims are not limited in that way. They are limited to the treatment of steel plates, but not necessarily previously hardened steel plates.

Senator CHANDLER. So you understand the full substance of the patent to be the application of hydraulic pressure to armor plates at a temperature between the two limits specified?

Mr. STAUFFER. Yes, sir; the face of plate having been previously supercarbonized?

Senator CHANDLER. Do you think that is the full scope of the patent?

Mr. STAUFFER. I think it is, as I recollect it. I was familiar with the patent at the time it was pending. That is all there is in it.

Senator CHANDLER. You may state now when the application was filed on which the patent was granted.

Mr. STAUFFER. The application was filed June 5, 1895.

Senator CHANDLER. State whether there had been any previous application by Mr. Corey.

Mr. STAUFFER. None that I am aware of, and such are generally accessible to the public.

Senator CHANDLER. Have you a copy of Mr. Corey's patent of which we have been speaking?

Mr. STAUFFER. I have.

The patent referred to is as follows:

[United States Patent Office. William Ellis Corey, of Munhall, assignor to the Carnegie Steel Company, limited, of Allegheny County, Pennsylvania. Steel armor-plate and process of making same. Specification forming part of Letters Patent No. 541,594, dated June 25, 1895. Application filed June 5, 1895. Serial No. 551,704. (No model.)]

[Diagrams are omitted.]

To all whom it may concern:

Be it known that I, WILLIAM ELLIS COREY, of Munhall, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steel Armor-Plates and Processes of Making the Same, of which the following is a full, clear, and exact description.

The accompanying drawing shows in side elevation, partly in longitudinal section, a furnace suitable for effecting the supercarbonization of the steel plates.

By use of my invention I produce steel having an unusual degree of toughness and strength, combined with extreme hardness, which is specially adapted to the manufacture of armor plates for vessels, and to other purposes for which the characteristics of great toughness and strength with extreme hardness are desired.

My invention lies in a new method of treating steel plates, which consists broadly in heating the plate, while one of its surfaces is in contact with a carbonaceous material, to such a temperature that the surface portion becomes supercarbonized, while the body of the plate is converted into a coarse crystalline and more brittle condition and then subjecting the plate to an extreme compression while at a temperature below 2000° Fahrenheit, and without producing more than a slight elongation, this compression being substantially uniform throughout the area of the plate.

It also consists in the product of said method.

In order to enable those skilled in the art to practice my invention, I will now describe my method as applied to the manufacture of armor plate, and similar large and thick bodies of steel.

Armor plates are usually of an average size of sixteen feet in length, eight feet in width, and from fourteen to eighteen inches in thickness, and supercarbonized or hardened on one side or surface only; the hardening effect in such case gradually decreasing from the supercarbonized surface toward the other side, as the necessary result of applying the carbon to one side only. My invention, however, applies to plates, slabs or ingots of steel hardened on both or all sides. I have stated the dimensions for the reason that in describing the process, so as to be intelligible to others skilled in the art, it is desirable to indicate the size of the articles to the treatment of which the temperatures and length of time used in the several steps are applicable; these features of my process being necessarily subject to modification, as the larger the size of the piece of steel under treatment the greater will be the heat, and to some extent the time of exposure thereto, which will produce the best results.

By the term "steel plate" as used in this specification, I mean plates made by any process of conversion of iron into steel, and whether the steel be or be not alloyed or mixed with nickel, aluminum, or other metal or alloy.

The plate, having been made of steel of the desired quality, cast into ingots and forged or rolled to the desired thickness and surface shape, is placed in the supercarbonizing furnace, in a receptacle or hearth of refractory material which may be removable to and from the furnace. The bottom of this receptacle is covered with a layer of comminuted carbonaceous material being of uniform thickness, preferably laid upon a layer of sand, and so placed as to be in close contact with the surface of the steel plate to be treated, which may be of plane, or curved, or irregular shape. The carbonaceous material used for this purpose may be such as animal or vegetable charcoal or coke or a mixture of any or all of these.

The advantage of placing the steel plate on top of the carbon is that the plate and carbon are thus brought into close surface contact, and when two or more plates are to be treated, they should be placed one above the other with the steel surfaces to be supercarbonized turned toward, and in contact with, the carbon, thus having one layer of carbon between two plates. If, as is usual in armor-plates, they are to be supercarbonized on one side only, the surface not requiring treatment is covered with some refractory material; or the access of the external air is otherwise excluded, so as to prevent the oxidation of the carbonaceous matter and of the steel.

The furnace containing the steel plates in the receptacle, as above stated, and used for heating the plates, may be a regenerative gas furnace, or one otherwise suitable. The furnace is heated to a comparatively low heat, say about 1950° Fahrenheit and the temperature is gradually raised, during a period of about ten days, until the steel is heated up to about 2175° Fahrenheit. The gas is then shut off and the furnace is banked for about a week's time, during which a gradual cooling takes place, until the plates are reduced in temperature to about 1600° Fahrenheit.

A furnace of suitable form for effecting the supercarbonizing of the steel plate is shown in the drawing, in which 2 is the heating chamber, and 3 a movable hearth or receptacle carried by a truck mounted upon wheels 4, and *adapted to* be moved into and from the furnace by a *motor cylinder 5.*

6 is the layer of carbon beneath the armor plate 7.

8 is the sand layer under the carbon, and 9 is a protecting covering of sand.

The result of subjecting the plate to the above treatment is to change the semi-fibrous character of the body of the plate produced by the previous working and convert it into a coarse crystalline condition, thus impairing the main mass while hardening its surface. This weakened condition of the plate, which has heretofore been inherent in supercarbonized steel plates, it is entirely removed by the next step of my process, which consists in compressing and compacting the plate at a low heat. The compressing operation not only restores to the metal its forged character, but also adds increased strength, density and toughness by reason of the low heat employed therein. As, however, it is important to ascertain the condition of the steel plates as to the degree of carbonization and the depth to which it has extended, it is preferable to postpone the compression of the plates until they have been tested. In this case they are allowed to remain in the furnace until reduced in temperature to about 1100° Fahrenheit so as to avoid air-hardening, which might occur at a higher temperature, and also to aid in annealing. When thus reduced in temperature the plates are removed from the furnace and receptacle in which they were heated and are allowed to cool gradually in the air to a suitable heat, say 100° Fahrenheit, when the faces which have been covered with refractory material are cleaned off with brushes or otherwise, and a few holes are drilled in each plate from the supercarbonized surface, and samples of the drilling at different depths are taken and analyzed to ascertain the depth and degree of carbonization. These plates, if they have been cooled for the purpose of testing, have to be reheated sufficiently for compression, up to about 1600° Fahrenheit, which reheating is, of course, not necessary when the plates are removed from the furnace at that temperature. Before replacing the plates in the furnace to reheat them sufficiently for compression, I cover the carbonized surface or surfaces with a coating of about three inches of pulverized carbonaceous matter, which may be protected in some suitable manner to guard against oxidation of the carbon or of the surface of the steel.

I have stated the degree of heat at which the plates are to be removed from the furnace for compression, or to which they are to be reheated for that purpose, to be about 1600° Fahrenheit, the purpose being to have the plates at as low a heat as will enable them to be compressed as hereinafter described; but the heat should not exceed 2000° Fahrenheit, the temperature required being a heat sufficiently high to permit the metal to be compressed, but below that proper for ordinary elongation and reduction of the metal in rolling. This reheating should be done slowly, so as to secure an even heat throughout the plate, and should take from ten to twenty hours, according to the size of the plate. The plate is then taken to the compressing machine,—a hydraulic press or a hammer adapted to impart a strong compression to the metal and to compact it throughout. I have found that the use of rolls is not desirable, as the metal will elongate and its body will not become compressed and condensed as when the press is employed. It is much preferable to use a hydraulic press, and I make the dies of the press (upper and lower) as long as the plate of steel is wide, and with comparatively narrow faces, say from ten to twelve inches. If the faces of the dies are too wide, the plate will have to be at a higher temperature, in order to secure the desired degree of compression; and a temperature as low as is compatible with that result is desired, as already

stated, in order to prevent decarbonization of the plate, and also to secure the condensing and compacting effect of the pressure applied, instead of a spreading or elongating of the steel, which would be the consequence if the metal was too hot.

When a hydraulic press is used which is capable of exerting a pressure of about ten and a half tons to the square inch of surface, an armor plate, of the dimensions before stated may be readily reduced an inch in thickness by each first stroke of the upper compressing die. The plate is moved forward between the dies after each stroke until the entire surface has been acted on. This operation is repeated, moving the plate back and forth, until sufficient compression is secured. By this means I have succeeded in reducing a plate of seventeen inches thick to a thickness of fourteen inches, with the effect of giving greatly increased toughness and strength to the steel. As the object is not to roll out the plate, and thus increase its length or width, but to effect an actual compression of the metal (although some increase in those dimensions will occur, as the plate need not be confined in any way), it it is obviously desirable to subject the metal to great pressure at as low a temperature as is compatible with the actual compression of the plate. In practice I find that when I thus compress a nickel steel armor-plate sixteen feet long, eight feet wide and seventeen inches thick, with a hydraulic press capable of exerting a compression of about ten tons per square inch, so as to reduce the plate to a thickness of fourteen inches, the plate elongates only about thirty inches more or less, and does not perceptibly expand laterally. After the plate has thus been toughened and compacted by pressure, it is annealed. For this purpose, it is reheated in the furnace during a period of about twelve hours, up to about 1350° Fahrenheit. The heat is then withdrawn, the plate remaining in the furnace for about forty-eight hours while slowly cooling.

During the reheating for annealing the supercarbonized portion of the plate is protected from oxidation by a light covering of carbonaceous matter, which may be protected by some suitable refractory substance, as before described.

When sufficiently cool after annealing and before tempering, the plate may, if desired, be again tested to ascertain whether it is sufficiently carbonized, and it is straightened by a forging press, or otherwise, and is machined to the required dimensions, the necessary allowance being made for contraction during the subsequent tempering, which is the last step of the process. In order to do this, the plate is again slowly heated in the furnace to about 1350° Fahrenheit, the precautions before employed to prevent oxidation of the surface being repeated, and any scale or other matter adhering to the carbonized surface of the plate is carefully removed, before and after reheating, by wire brooms, or if necessary by hand hammering. The reheated plate is hardened by means of cold water, which may be conveniently applied to the plate in a horizontal position on an open frame work, between a series of nozzles above and below the plate, which spray copious jets of cold water on the plate. This is continued until the plate is sufficiently cold, say at a temperature of 100° Fahrenheit. This completes the operation, excepting that if the plate has become misshapen by the water cooling it is reheated to a low temperature, say 200° Fahrenheit, sufficient to permit of its being rectified in shape by the hydraulic press or otherwise, and that it has to be machined or ground by an emery wheel to the exact size required.

In describing my operation I have thought it necessary to state the degrees of temperatures which I have found it advisable to use in the

various steps of my process; but I do not desire to confine myself to the exact temperatures described. I deem it important, however, to conduct the various steps of my process in which heat is applied, at as low a degree of heat as is consistent with successful operation, and especially is this the case when the steel is being compressed, as the object is to produce homogeneous compression or compression throughout the entire mass, and to as great a degree as possible, so that the heat should be as low as will permit of the actual compression and compacting of the steel. I also desire to have it understood that it may not be necessary in all cases to observe the exact order of operation, or to perform all the steps described, as, for example, it is not necessary to allow the steel plates to cool and then to reheat them before subjecting them to compression, although, as before stated, it is desirable previously to treat the carbonization of the plates, for which purpose they should be cooled enough to handle, and would then require reheating.

In this specification I have referred to the protecting of the plate while being reheated, with a coating of carbonaceous matter, and a superimposed layer of finely comminuted refractory substance. This is specially important where nickel steel (by which I mean steel to which nickel in any proportion has been added) is being treated for carbonization, or in any case where nickel steel requires to be subjected to heat owing to the excessive scaling, or surface oxidation to which nickel steel is subject. In order to obviate this, I carefully remove any scale or loose scale from the nickel-steel before reheating it, and cover the carbonized surface with a layer of from two to four inches in thickness of dry carbonaceous matter of any description, such, for example, as coke dust or charcoal, and protect this carbonaceous matter from oxidation in any suitable manner.

In reciting in my claims the first or supercarbonizing step of the process, I wish to be understood as covering not only the specific step recited above in my specification, but also any step of supercarbonizing wherein the metal is heated and exposed to carbon in any form such as the well known method by the use of gas which is passed over the heated plate.

The advantages of my invention are apparent, since the metal which has been impaired by the supercarbonizing step is not only restored to its former texture, but is condensed and its strength materially increased, thus combining the advantages of a plate having a carbonized face with those of a non-carbonized but forged plate having the strong character peculiar to forged metal.

The characteristics of the steel plates treated as described above, which constitute an improved article of manufacture, and by which they may be distinguished from plates treated by heretofore known processes, are an extremely hard face of condensed steel, with a high degree of carbonization at the surface than in the interior, showing on fracture a texture approaching the fibrous as distinguished from crystalline; the grain of the metal being fine as distinguished from the coarse grain appearance of cast steel, yielding a much higher ballistic test, say from twelve to fourteen per cent. higher, of a tensile strength about twelve per cent. greater, an elongation of about fifteen per cent. greater, and a much greater resistance than plates made by processes known and used prior to my invention.

I claim—

1. The herein described method of treating a steel plate containing carbon, consisting in heating the plate, while one of its surfaces is in *contact with* a carbonaceous material, to such a temperature that

portion becomes supercarbonized while the body of the plate is converted into a coarse crystalline and more brittle condition, and then subjecting the plate to extreme compression while at a temperature sufficient for compression, but below that proper for the ordinary elongation and reduction of such steel by rolling, producing by such compression a compacting of the plate without more than a slight elongation, said compression being substantially uniform throughout the area of the plate, whereby the thickness of the supercarbonized surface portion as well as of the body of the plate is materially decreased and the structure of the steel is brought throughout into a fine grained, tough, dense condition.

2. The method of treating a steel plate consisting in supercarbonizing the surface portion of the plate and then subjecting it to a succession of step-by-step compressions each operating over a small portion only of the surface while at a temperature below 2000° Fahrenheit until the desired degree of reduction is attained, substantially as described.

3. The method hereinbefore described of producing compressed carbonized steel, consisting of carbonizing the plate, slab or other article of steel, by applying to the side or sides, surface or surfaces to be carbonized, comminuted carbonaceous matter, protected from oxidation by suitable covering; exposing the same to the heat of a furnace, and therein heating the same to effect carbonization, and afterward, when the plate is at a temperature sufficient for compression, but below that proper for the ordinary elongation and reduction of such steel by rolling, subjecting the plate, at the low heat indicated, to sufficient pressure to effect the compression of the metal without producing more than a slight elongation, and subsequently annealing and hardening the same, substantially in the manner and for the purpose described.

4. The process hereinbefore described of preparing hardened steel-plates for armor plate, consisting of the following steps:—carbonizing the plate previously formed to substantially the required shape, by covering the same, on the surface to be hardened, with comminuted carbonaceous matter placed in close surface contact with the plate, protecting from the access of air the carbonaceous matter as well as the portions of the plate not requiring carbonization, with refractory material, or in other suitable manner; placing the same in a suitable furnace, heated to about 1950° Fahrenheit, gradually raising the heat during a period of about ten days, until the steel is heated to about 2175° Fahrenheit, then gradually cooling down until the steel is reduced to about 1600° Fahrenheit, subjecting the plate, at that heat, or thereabout to forcible compression, thereby compacting the metal; then annealing the plate by reheating it, (the carbonized surface being protected from oxidation) and slow cooling; and, after straightening, testing and machining the plate to the exact shape required, hardening the plate by slowly reheating in a furnace to about 1350° Fahrenheit and then cooling by the application of cold, substantially as and for the purpose described.

5. As a new article of manufacture, an armor plate composed throughout of steel having an extremely hard face more highly carbonized than the interior of the plate, said face and body being in a highly compressed and compact condition and considerably denser than similar plates which have been shaped or reworked at the usual forging temperature and the body being composed of non-crystalline steel of a forged or semifibrous nature, showing in fracture throughout its mass a fine *grained dense condition* in contra-distinction to the coarse crystalline

appearance of cast steel, and giving a much higher ballistic test than ordinary non-compressed supercarbonized or surface hardened steel of the same dimensions; substantially as described.

In testimony whereof I have hereunto set my hand, June 4, 1895.

WILLIAM ELLIS COREY.

Witnesses:
H. M. CORWIN,
C. BYRNES.

Senator CHANDLER. State now all the prior inventions or patents or claims for patents with which the application of Corey was compared. Were there any interferences of any sort?

Mr. STAUFFER. There were no interferences and there was no appeal. I can not give the other inventions with which it was compared.

Senator CHANDLER. You have no document here showing the other inventions?

Mr. STAUFFER. That can be obtained from the files, but I have not a complete copy of the files.

Senator CHANDLER. The record which you have hitherto examined does not show with what other inventions or claims for inventions it was compared?

Mr. STAUFFER. No, sir.

Senator CHANDLER. How can that be obtained?

Mr. STAUFFER. It can be obtained merely by a request for it or by a request upon the Commissioner for a complete copy of the files.

Senator CHANDLER. Then, I will request you to furnish, with the permission of the Commissioner, a statement of all the patents, all the inventions, or all the claims for inventions with which the process disclosed in the application of W. E. Corey was compared. Let it be a concise historical statement.

Mr. STAUFFER. Do you simply wish the references themselves or do you want the data?

Senator CHANDLER. I merely desire, in the first instance, a list of the claims or the supposed inventions with which, in the process of granting this patent, the Corey invention, or his supposed invention, was compared, so far as that can be ascertained.

Mr. STAUFFER. Very well. It can be ascertained, of course.

The statement referred to is as follows: United States, No. 89876, May 11, 1869, McDonald; United States, No. 442065, December 2, 1890, Low; United States, No. 518908, April 24, 1894, Ackerman; British, No. 3084, December 1, 1865, Dods; British, No. 3832, October 16, 1877, Browne.

Copies of these references are hereunto annexed.

[United States Patent Office. Hugh McDonald, of Pittsburg, Pennsylvania. Letters Patent No. 89,876, dated May 11, 1869. Improvement in the manufacture of steel-faced iron plates. The Schedule referred to in these Letters Patent and making part of the same.]

To all whom it may concern:

Be it known that I, HUGH MCDONALD, of the city of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Manufacture of Steel-Faced Iron Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

For many purposes, in the arts, metallic plates are required, which *shall possess great* strength, toughness, and tenacity of fibre, and, at

the same time, have a hard, smooth face, and capable of receiving a high finish.

Such a combination of qualities is especially desirable in plow-plates.

To secure such a combination, plates have been made with an iron centre and steel face on one or both sides, by welding iron and steel plates together, also, by casting a steel face on a previously-heated iron slab, in a suitably-constructed mould, and, also, by subjecting one or both faces of a homogeneous iron slab, or ingot to the process of cementation, thereby converting such face or faces into steel.

My invention relates to the production of such plates, but of a greatly improved quality, and differs, in the mode of accomplishing the object, from all those above referred to; and

The nature of it consists in the manufacture of such plates by combining the processes of welding and cementation, so as to secure a centre or back, as the case may be, of tough fibrous iron, and a face or faces of a high quality of steel, each layer of iron or steel being almost entirely homogeneous in its character, but all securely united together into a single plate.

My invention is applicable to the production of plates of any required number of layers of iron or steel, but I propose to apply it chiefly in making plates of two or three layers, one or both faces being of steel, and the back or centre being of iron; and to enable others skilled in the art to make and use my invention, I will proceed to describe the same, first, as applied in making plates with steel faces and iron centre.

For the iron centre, I take a plate, bar, slab, or ingot of wrought-iron, which has but little affinity for carbon, or which possesses but a small amount of carbon, since I find that the less carbon a wrought-iron plate contains, the more slowly will it be converted into steel by cementation.

For the outside surfaces, I take plates, bars, slabs, or ingots of wrought-iron, or a low quality of steel, such as possess a larger proportion of carbon, or have a greater affinity therefor, so that when subjected to the process of cementation, they will be readily and rapidly converted into steel of a high quality.

These plates, of any desirable size or thickness, I bring to a welding-heat, and weld together, either under the hammer or by passing them through between rolls, using, if necessary, any of the ordinary fluxes, to facilitate the welding. After they are thus welded, they may be drawn out between rolls in the usual way, either before or after cementation, or partly before and partly after.

In order to secure a steel surface of a high quality in such compound plates, I subject them to the process of cementation in any suitably-constructed furnace, covering with clay or otherwise protecting, if necessary, the parts of the plate not to be converted.

The iron or low quality of steel, which forms the outer layers as described, is of such quality as is readily and rapidly converted into steel, while the centre, being of a quality of iron that has but little affinity for carbon, will be affected but little, or not at all, by the converting of the outer layers. Hence, the surfaces of the compound plate may be converted as perfectly as may be desired into steel of the hardest quality, and capable of receiving a high polish, while the centre is almost wholly, if not not entirely unaffected by the cementing-process, and retains all its qualities of toughness, strength, and flexibility.

The same process may be applied to making plates having a steel face and iron back, the steel face only being converted.

Two or more layers of iron, or of iron and steel, may be used for the

centre or back, provided the layer or layers of iron, next the face-plate or plates, be of a quality not so readily converted into steel as the face-plates themselves are.

When the plates are finished by cementation and rolling, they are ready for market, or to be cut up into plow-plates or other useful articles.

What I claim as my invention, and desire to secure by Letters Patent, is—

The hereinbefore-described mode of making compound metallic plates, by welding together two or more plates, slabs, bars, or ingots of iron of different relative capacities for taking carbon, or of iron and a low quality of steel, and then subjecting the face or faces of such compound plates to the process of cementation, substantially as described.

In testimony whereof, I, the said Hugh McDonald, have hereunto set my hand.

HUGH MCDONALD.

Witnesses:
G. H. CHRISTY,
JOHN GLENN.

[United States Patent Office. Robert Low, of Woolwich, England. Process of hardening or tempering steel projectiles. Specification forming part of Letters Patent No. 442,065, dated December 2, 1890. Application filed November 16, 1888. Serial No. 291,060. (No model.) Patented in England April 23, 1887, No. 5,954; in Belgium February 29, 1888, No. 80,724, and in France April 25, 1888, No. 188,799.]

[Diagrams are omitted.]

To all whom it may concern:

Be it known that I, ROBERT LOW, engineer, a subject of the Queen of Great Britain, and a resident of Woolwich, England, have invented a new and useful Improved Process of Hardening or Tempering Steel Projectiles, (for which I have obtained patents in the following countries: in Great Britain, No. 5,954, dated April 23, 1887; in France, No. 188,799, dated April 25, 1888, and in Belgium, No. 80,724, dated February 29, 1888,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to steel projectiles, and comprises an improved process or method of hardening or tempering the same, so that their strength and penetrativeness are greatly increased as compared with those hardened or tempered by the methods hitherto adopted.

The hardening or tempering of armor-piercing projectiles has heretofore been usually effected by heating them to the required temperature, and then wholly or partially immersing them in oil or other liquid. It has been found, however, that this method of hardening or tempering such articles as projectiles, though efficient in respect of imparting the required hardness to the steel at or near the surface of the projectile, is attended with the serious disadvantage of liability to splitting or cracking of the metal and consequent destruction of the projectile after the entire cost of its manufacture has been incurred.

My invention affords the means for effectually hardening or tempering the projectiles without the use of water or other liquid, and, moreover, it obviates the risk of injuring or destroying the projectiles in the manner above described.

In hardening or tempering a projectile according to my said invention, I proceed as follows—that is to say: I heat the said projectile to the required temperature and place the same (preferably in a vertical position with its conical, conoidal, or ogival end downward) in a supporting die or mold of cast-iron or other suitable material, the cavity in which is of the same or *approximately the* same dimensions and shape or configuration as the

projectile or portion thereof. When commencing operations, the mold is preferably heated (say to a temperature of from 200° to 300° Fahrenheit) before a projectile is inserted, in order to avoid chilling of the surface of the said projectile. In continuing the operations sufficient heat is imparted to the mold by each projectile to prevent chilling of the next projectile inserted. While the projectile is in this mold I subject it to pressure by means of hydraulic or other power for the purpose of keeping the surface of the projectile in intimate contact with the interior of the mold, and thus insuring the conduction of the heat away from the projectile through the metal of the mold. This pressure is maintained until the projectile is sufficiently cooled and hardened, and the projectile is then removed from the mold. If the projectile to be tempered by the above-described process is made from steel rich in carbon and containing about four per cent. of chromium, I find that very good results are obtained by heating the said projectile before placing it in the die or mold to a temperature of from 1,400° to 1,600° Fahrenheit, according to its size, and then allowing the said projectile to cool down to a temperature of about 200° Fahrenheit before removing it from the mold. The temperatures to which the projectiles are heated and allowed to cool will, however, necessarily vary with different compositions of steel, and as in tempering by the well-known methods with water or oil the operator must to a great extent be guided by his experience of the steel with which he is dealing. I find it advantageous to use a mold having a central hole or recess into which the point of the projectile will enter. I thus avoid liability to excessive hardening of the point of the projectile and injury of the point in the operation of placing the projectile in the mold. Moreover, the said hole permits the escape of any scale, dust, or the like which may be introduced into the mold with the projectile or otherwise. The mold must be of greater or less depth, according to the length of the portion of the projectile which it is desired to harden or temper. If the entire surface of the projectile is to be hardened, the cavity in the mold should be of the same or nearly the same depth or length as the projectile.

In the accompanying drawings, Figure 1 is a vertical central section of apparatus for holding a projectile while subjected to pressure and at the same time cooling it, a part of the hydraulic ram for applying the pressure being shown in elevation. Fig. 2 is a similar view showing a modified form of the said apparatus.

The remaining figures are hereinafter referred to.

a is the mold; *b*, the projectile; *c*, the hydraulic ram. The mold *a* is made with a central hole *a'* for the purpose above specified, and its cavity is of such dimensions and shape or configuration that the conical or conoidal end of the projectile will fit accurately therein. A ring or annular piece *d* is placed upon the mold *a* and has fitted therein taper segments *e*, so formed that they will fit accurately within the said ring or annular piece and closely around the cylindrical portion of the projectile. These segments can be readily withdrawn from the ring or annular piece *d* to facilitate the removal of the projectile from the mold *a*.

A plug, mandrel, or core-piece *f* is inserted in the chamber or cavity of the projectile to prevent upsetting of its walls or deformation of the said chamber or cavity. This mandrel receives pressure from the ram and transmits it to the interior of the shell.

The apparatus shown in Fig. 1 is designed for use when the entire mass of the projectile is to be condensed and hardened.

If the *conical, conoidal*, or ogival end only of the projectile is to be

condensed and hardened, I dispense with the said ring or annular pi and segments and also with the said core-piece, and, as shown in F 2, simply place a ring *g*, of metal or other suitable material, upon mold *a* to conduct away some of the heat from the projectile, and t insure a gradual diminution of the hardness of the metal of the pro tile at the top of the mold *a*. I prefer, moreover, to place a disk or pa of asbestus or other suitable nonconductor or slow conductor of h between the base of the projectile and the ram *c* to prevent coolin the said base by the ram.

By applying the pressure in the manner illustrated in Figs. 1 an the particles or molecules are compelled to assume under the cont tion due to the cooling such a condition or arrangement that they offer the greatest resistance to endwise compression, and this resul effected without inducing the state of tension which would be indu by cooling in liquids. Consequently the stress to which the projec is subjected in the act of penetration is a repetition of that to wh it has already been subjected when in the mold. In some instance employ a mold in which the projectile lies horizontally. This mol made in two parts or halves, in one of which the projectile is to be l and the other of which is to be placed over the said projectile, and I ap pressure either continuously or intermittently to the projectile whil the said mold in a direction at right angles to its axis; or I may form mold of three, four, or more segments provided with means for adjust them, so as to apply the pressure equally all round the projectile.

Figs. 3 and 4 are sectional elevations showing different forms apparatus in which the projectile is to be placed horizontally. T apparatus comprises lower and upper dies or molds *a* a^2. The lo die or mold *a* is supported upon a base-plate *j*, formed with lugs bearing-pieces *j'*. The upper die or mold a^2 may be firmly attached the ram *c*. The base-plate *j* is provided with a standard *k*, thro which is passed a screw *l*. In some instances a mandrel or plug inserted in the cavity of the projectile or shell, as in Fig. 3. In s instances the screw *l* is provided with a plug *l'*, as in Fig. 4, which into the cavity of the projectile or shell. This screw prevents the placement of the projectile from the mold when subjected to the p sure of the ram. If the pressure is to be applied intermittently, said screw may be slackened from time to time and the projectile tially rotated. Whatever may be the construction of the mold it sh be made to conform to or fit the exterior of the projectile or a por thereof, and the projectile while in the mold should be kept under p sure, so that there may be close contact between all parts of the sur to be hardened and the mold, and the heat of the red-hot mass of m may be conducted freely away through the body of the said mold.

Having now fully described and ascertained the nature of my invention and the manner in which it is to be performed, I wish it u stood that I do not claim generally or irrespectively of my improvem herein set forth the treatment of steel by heating the same and subj ing it to pressure in a mold, as I am aware that such treatment of s has been described in the specification of the British Patent No. 3, of 1874, granted to Sir Joseph Whitworth, and also in the specifica of the French Patent No. 147,010, granted to M. Clemandot; nor claim the methods of treatment described in the specifications of United States Patents Nos. 178,044 and 407,536.

What I claim is—

1. The method of hardening or tempering a projectile or shell, *sisting in heating* the said projectile, placing it in a metal mold

internal shape of which exactly corresponds to the external shape of the projectile or of the part thereof to be hardened, and which has been previously warmed to prevent chilling of the surface of the projectile, and then subjecting the projectile to pressure in the mold to insure intimate contact of the surface of the projectile with that of the mold until the said projectile is cooled sufficiently to impart to it the desired degree of hardness, substantially as and for the purposes set forth.

2. The method of hardening or tempering a projectile or shell, consisting in heating the said projectile, placing it in a metal mold the internal shape of which exactly corresponds to the external shape of the projectile or of the part thereof to be hardened, and which has been previously warmed to prevent chilling of the surface of the projectile, and then subjecting the projectile to pressure in the mold to keep its surface in intimate contact with the interior of the mold until the said projectile is cooled sufficiently to impart to it the desired degree of hardness, such pressure being caused to act from the base toward the point of the projectile, substantially as and for the purposes set forth.

3. The method of hardening or tempering a projectile or shell, consisting in heating the said projectile, placing it in a metal mold the internal shape of which exactly corresponds to the external shape of the projectile or of the part thereof to be hardened, and which has been previously warmed to prevent chilling of the surface of the projectile, and then subjecting the projectile to pressure in the mold to keep its surface in intimate contact with the interior of the mold until the said projectile is cooled sufficiently to impart to it the desired degree of hardness, the said mold having a cavity or opening through which the extreme point of the shell will project and through which the gases and scoriæ may escape, substantially as and for the purposes set forth.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT LOW.

Witnesses:
WM. ROBT. LAKE,
DAVID YOUNG.

[United States Patent Office. Albert A. Ackerman, of the United States Navy, assignor of one-half to Thomas T. Crittenden, of Washington, District of Columbia. Manufacture of armor-plate. Specification forming part of Letters Patent No. 518,908, dated April 24, 1894. Application filed October 26, 1893. Serial No. 489,195. (No model.)]

[Diagrams are omitted.]

To all whom it may concern:

Be it known that I, ALBERT A. ACKERMAN, a lieutenant in the United States Navy, attached to the Bureau of Ordnance, Navy Department, Washington, in the District of Columbia, have invented certain new and useful Improvements in the Manufacture of Armor-Plates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in the manufacture of armor plates or other like castings or forgings, and is especially adapted for use in hardening and toughening the surface of such plates.

It is well known that, other things being equal, the loss of heat of a *solid body through* radiation, varies with the area of the radiating sur-

face; and also that the increase of heat through absorption varies with the area of the surface exposed to the heat rays; from this it follows that where two sides or faces of a plate are of unequal surface, then the side having the greater surface is capable of being more rapidly heated or cooled than the opposite side; thus where one side of a plate is corrugated and the other side smooth, or comparatively smooth, the corrugated side will absorb and radiate heat more rapidly than the smooth side and hence a desired temperature may be reached on that side, and in these corrugations and enlargements earlier and with less expense for fuel and labor than when, as is the case on the smooth side, the receiving surface is smaller, and the section through which heat flows away into the body of the plate is greater. Again, where heated plates having parallel smooth faces are cooled, in hardening or toughening the outer edges and corners of the plate cool more rapidly than the central portion, producing an initial "set" of the outer portions and causing the central portion as it cools to assume a stress due to its contraction within the fixed bounds of the outer and colder portions. This produces inequalities in structural strength in the plate and weakness in places. This may be avoided by so increasing the area of radiating surface near the center of the plate that the loss of heat may be approximately uniform all over the area of the surface of the plate. Again, it has been found, where armor plates have been heated to a high temperature and then gradually cooled, the one face being cooled more rapidly than the other, that the face cooling faster first assumes a "set" to which the entire mass of material adapts itself; and that when the slower cooling portion becomes rigid, the plate is "buckled" toward the side last cooling. This may be avoided by constructing the plate with radiating surfaces so arranged that, although the media into which the radiation takes place may differ, the amount of heat radiated from each side of the plate may be practically the same; and thus there may be no tendency of the plate to "buckle." Or this tendency to "buckle" may be regulated by varying the surfaces of the two sides of the plate. Since the effect of these variations in the surface giving out or absorbing heat will depend upon so many things in or around the furnace, it will be impossible, at present, to lay down any fixed rule, but the variations will probably have to be determined by experiment in each particular furnace. Again, in the Harvey and kindred processes, where elements or compounds are caused by means of heat to impregnate the surface of armor plates, the penetration of these foreign substances extends only to a limited distance from the surface, and varies to a certain extent inversely as the depth therefrom; now if by deep cuts or corrugations, or pockets, the area of the surface is increased, then the amount of material affected by these hardening and toughening agents is increased; and if these projections or corrugations be rolled or pressed down afterward to form a smooth surface, then the depth of Harveyized material under that surface will be increased approximately in proportion to the comparative areas of the surfaces before and after rolling. Moreover, where a given thickness of impregnated material is desired, the time necessary for carrying out the process will be shortened in proportion to the increased area of exposed surface. This is very important as the time required for treating an armor plate under the Harvey process is ordinarily from ten days to three weeks, entailing great expense in maintaining the amount of heat required. My process also diminishes the serious scaling in such processes of cementation or conversion both by decreasing the time and *by permitting* the same effects to be obtained at a lower temperature,

thus, in the latter case, extending the life of the furnace. Since the higher percentage of graphitic carbon renders that part of the plate softer at the same high temperature, these carburized corrugations or projections are readily rolled or pressed down into a smooth surface without danger of overheating the plate. In addition, work done on the plate will be concentrated on this corrugated surface due to its greater softness, thus improving that surface which is exposed to greatest strains and which in the unworked surfaces of other processes is known to be lowered in quality and toughness by the heterogeneous mixture of graphitic carbon. Moreover, by this means, the percentage and extent of carburization may be controlled by the shape and dimensions of ridges or corrugations; that is, when these ridges are made narrow and deep, the percentage of carbon will be high while the depth of its penetration will be comparatively slight. By introducing other shapes, the gradation of carbon from the carburized to the uncarburized portion of the plate may be made more or less abrupt, superficial, or deep, and in this way a high carbonizing and hence great hardening effect may be extended deeply into the plate, without permitting the loss of toughness to lower the quality of a large depth of plate. This applies particularly to the case where carburizing is applied directly to the ingot on which these ridges are provided, the metal in this case being subjected to an annealing process, as it were, while the carburizing is being carried on. The ingot will not only be benefited by the annealing process, but the specific gravity of the metal, being less than in the forged metal, the process will be more rapid. And by means of the enlargements of surface as hereindescribed, the carburizing in any form may be carried to any desired depth without rendering the back of the plate brittle or too high in carbon.

Figures 1 and 2 represent cross sections of plates having one side or face smooth and the other face corrugated or dentated as at *a*. Fig. 3 represents a cross section of an armor plate that has its front face indented with compound corrugations as at *a*. The shaded portion *b* of the said plate indicates the depth to which the carburizing of said plate would extend. Fig. 3ª represents a cross section of the same plate shown in Fig. 3 after the corrugations are rolled down; the carburized portion *b* of the plate being represented by shade lines. Fig. 4 represents a cross section of a carburized indented plate, the carburization being shown in shaded lines as at *b*. When rolled out flat this plate would resemble that shown in Fig. 3ª. Fig. 5 represents a front view of a plate having its radiating or absorbing surface increased by a plurality of hatchings *a* crossing each other in the face of the plate. Fig. 6 represents a front view of a plate provided with a number of elliptical grooves *a* in the face thereof, the said grooves being spaced farther apart toward the outer edges of the plate whereby the radiating surface of the center of the plate may be increased, and the plate may be caused to cool more uniformly. Fig. 7 is similar in every respect to Fig. 6, except that the elliptical grooves are replaced by coarse indentations or chiselings *a*, which are deeper and more frequent near the center of the plate than toward the edges thereof, whereby greater uniformity in the cooling of the plate is obtained. Figs. 8 and 9 represent cross sections of hollow cylindrical bodies having their radiating interior surfaces largely increased by indentations such as are shown at *a*. The tendency of hollow cylinders constructed in these shapes would be to facilitate the transmission of heat from without *and to retard the* transmission of heat from within. This con-

struction would rather be of advantage for water tubes for boilers than for armor however. It will be evident that forgings or castings of this shape might be carburized from both sides and thus completely through. Fig. 10 represents a cross section of a stellated body indented as at *a* and inclosing a cylindrical chamber. Armor for conning towers, smoke stacks, and the like might be readily carburized while in this shape and then forged down to a cylindrical exterior thus giving greater depth to the carburized surface than where cylindrical bodies are so treated. Fig. 11 illustrates a combination of the types shown in Figs. 9 and 10 and represents a steel casting or forging readily adapted for carburizing from both sides or all the way through. Fig. 12 represents a cross section of a steel plate corrugated as at *a* on both sides, and adapted to be carburized on either or both sides, and to radiate heat as readily from one side as from the other; and Figs. 13 and 14 represent cross-sections of plates unevenly indented as at *a* upon opposite sides and adapted to radiate heat faster from one side than from the other. These various figures represent types of either castings or forgings on which these increased surfaces have been provided in any convenient way. These castings or forgings are treated by any of the herein described processes, and may be then either left with the ridges intact, or may be forged an approximately smooth surface.

The depth of the indentations *a* may not be nearly so deep, relatively, as is shown in the drawings, but the larger the increase of surface the more pronounced will be the effect.

It will be evident, while I have particularly described the advantages of my invention with regard to the carburization, that it is equally applicable to those processes wherein chromium, nickel, nitrogen and other elements or compounds are introduced into the metal and it is also applicable to all processes of cementation, conversion, case hardening, tempering, and annealing.

From the foregoing it will be seen that my invention consists in so varying the area of surface on one or both sides of the plate or mass of material to be subjected to heat or chemical treatment, that the mass may be more readily affected by thermal or chemical agents.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

In the manufacture of armor plates, the method of treating the plate or ingot which consists in providing on one of the faces thereof a plurality of grooves or corrugations, in heating the surface so increased in contact with a carburizing agent, in removing the unabsorbed portion of the carburizing agent from the plate, and in forging the projections down to an approximately smooth surface, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT A. ACKERMAN.

Witnesses:
JOHN C. WILSON,
PERCY C. BOWEN.

[No. 3246 of 1871. Nov. 30. English patent to William Robert Lake, for improvements in the cementation or conversion into steel of wrought iron or articles first made thereof.]

Now, know ye, that I, the said William Robert Lake, do hereby declare the nature of the said invention, and in what manner the same *is to be performed*, to be particularly described and ascertained in and *by the following* statement:

This invention relates to the manufacture of axes, chisels, hammers,

saws, augers, and other tools and instruments which are usually made of steel or of malleable iron, or partly of both by welding, and also to the manufacture of rails, axles, and parts of machinery where steel may be substituted for malleable iron, or be usefully combined with malleable iron by welding.

The articles to be treated are made of and with wrought iron first, without, however, finishing them completely, and then converted wholly or partially into steel by immersing them in a bath of molten cast iron free from sulphur or phosphorous and carburized to its utmost capacity. The best cast iron for this purpose is spiegel eisen, but in default thereof such cast iron may be made by melting good malleable iron or blister steel in a cupola furnace with the purest fuel available, that is as free from sulphur as possible.

The articles are left in this bath a space of time which must vary with the degree of hardness desired to be imparted to the metal and with the size of the articles, and also according to the intention of converting the whole mass into steel or of converting simply the surface so as to retain a core of malleable iron.

Crucibles may be used for treating small objects, but for larger articles or when large quantities are to be converted the ordinary reverberatory furnaces may be used, the bottom of which I build with silicious sand.

After a number of operations with the same bath the cast iron would not be rich enough in carbon, and consequently the heat required to maintain it in a molten condition would be too high, which circumstance might cause the fusion of the parts sufficiently carburized before the underlying layers had attained the proper degree of conversion. To obviate this difficulty I line the crucibles and the bottom of the furnaces with a brasque of charcoal powder or of plumbago, with which I may incorporate nitrogenous matters such as cyanides, or animal matters, as leather or horn pulverized, and also black oxide of manganese. This brasque is intended to restore to the bath of cast iron the carbon which may be abstracted from it by the metal during cementation, and to supply the manganese and nitrogen, which may be useful to the steel, but it is not indispensable to the process.

The bath of cast iron may be renewed after each operation by using fresh cast iron, or by remelting and recarburizing the same in a cupola furnace in contact with fuel as pure as possible and running it directly from the cupola into the converting furnace over the objects to be cemented. The converting bath may also be covered during the operation with a glass or slag covering to prevent the loss of carbon by contact with the gas of the furnace.

After remaining in the converting bath the time required for the degree of conversion sought for, the converted articles are taken out—or better still, the cast iron is tapped and run off—and the heat in the furnace increased to free the objects from any portion of cast iron which might adhere to them, when it will be found that they are, according as the operation has been conducted, partly or totally converted into steel, the quality of which will depend upon that of the iron used. The articles are then finished by rolling or hammering.

Having thus fully described the said invention as communicated to me by my foreign correspondent, I wish it understood that I do not claim the principle of cementing malleable iron by immersion in molten cast iron, as this was to a certain extent practised anciently upon lumps of wrought iron; but I claim—

First. *The cementation* or conversion into steel of articles made of *wrought iron by immersing* them in a bath of molten cast iron after

they have been totally or partially worked into their respective shapes, whereby the heaviest part of the work or the whole of it is accomplished upon wrought iron and not upon steel, and the operation of welding steel upon iron is dispensed with.

Second. The cementation or conversion into steel of articles made of wrought iron by immersing them in a bath of cast iron in fusion in such a way as to convert only the surface of such articles to the required depth, leaving the interior in its original state of malleable iron, thereby producing articles externally as hard as those made of pure steel, with the toughness dependant upon that part of their substance retaining the nature of malleable iron, and free from the inconvenience of imperfect welding.

Third. The use of furnaces to effect such conversion on a large scale.

Fourth. Lining crucibles or furnaces with a brasque of pure carbonaceous matter and nitrogenous substance and oxide of manganese to keep the bath of cast iron to its normal degree of carburization and to supply nitrogen and manganese to the steel.

Fifth. Composing the bath of pure cast iron necessary for such conversion by melting wrought iron or blister steel in a cupola furnace with pure fuel and recarburizing the bath by returning the cast iron to the said cupola furnace whenever required, the whole as above described and for the purposes set forth.

[No. 3084 of 1865. Dec. 1. English patent to Thomas Weatherburn Dodds. Improvements in the manufacture and treatment of railway bars, tyres, and axles, also in the construction of furnaces, machinery and apparatus connected therewith.]

[Diagrams referred to are omitted.]

Now, know ye, that I, the said Thomas Weatherburn Dodds, do hereby declare the nature of my said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon (that is to say):

My invention of "Improvements in the manufacture and treatment of railway bars, tyres, and axles, also in the construction of furnaces, machinery, and apparatus connected therewith," consists in the construction of the cementing or converting furnaces used in steeling the wearing surfaces of railway bars or other material to be operated upon in such a manner that uniformity of heat will be obtained, or the heat can be increased or diminished at any required portion of the furnaces, as may be found desirable, and the railway bars or other material operated upon may be withdrawn when the required depth of steeling has been obtained.

For the purpose of obtaining uniformity of heat in the cementing chambers, chimneys and dampers are applied to each side of the furnace in connection with the side flues, the communication with which chimneys may be separately opened or closed as required, thereby giving facilities for the regulation of the heat not obtained by the use of a single chimney, as usual. Also for the purpose of increasing or diminishing the heat at any required portion of the furnace a series of adjustable flue valves or regulators are applied to the openings leading into the side flues.

By another arrangement the cementing furnaces are heated by the waste heat from coke ovens, or the gases generated therein, or from the waste heat of other furnaces, to which coke ovens or furnaces the *cementing furnaces* are connected by means of communicating flues.

For the cementation of endless tyres the cementing chambers are circular and constructed so that the upper portion or dome thereof can be removed or lifted off its seat and the tyres taken out without letting out the furnace fires or cutting off the connection with the source from which they are heated. The railway bars (or metal in other forms) after undergoing the process of cementation are to be drawn from the cementing furnaces in a heated state, and are then to be passed at once, without reheating, through rolls or under hammers for the purpose of condensing or closing the fibres or crystals of the said bars or other material. The rolls are specially arranged to condense those portions of the railway bars, tyres, or axles where the process of cementation has been applied. For this purpose two, three, or more rolls are or may be employed, and they are arranged as required to suit the form of the railway bar or other article to be operated upon, some of the rolls being adapted for holding the said bar or other article and the other roll or rolls being adapted to condense the cemented surface or surfaces thereof.

Having thus stated the nature of the said invention, I will proceed to describe more particularly in what manner the same is to be performed by reference to the accompanying drawings, in which are represented cementing furnaces and condensing rolls of the construction and arrangement referred to.

DESCRIPTION OF DRAWINGS.

Figures 1 to 8 represent a cementing furnace for railway bars and axles. Fig. 1 is a vertical section taken through the centre of the furnace in the line C D, of fig. 3, shewing one end of the furnace; fig. 2 is a similar section taken in the line A B, of the same figure, shewing the other end of the furnace; fig. 3 is a transverse section on an irregular line; fig. 4 is a horizontal section taken on the line L M; Figs. 5 and 6 are similar sections taken respectively on the lines F G and H I, of fig. 3, and fig. 7 is an end view of the furnace. In these several figures the same letters of reference indicate corresponding parts.

a a are the walls and main brickwork of the furnace; *b* is the fireplace; *c c* are the cementing chambers, which extend from end to end of the furnace, and are closed only by doors at each end, being otherwise open to admit of the railway bars or other articles being withdrawn after the process of cementation has been completed; *d d* are flues, which it will be seen on reference to fig. 3 surround the cementing chambers and communicate with slide flues *e e* leading to the chimneys *f f*. These chimneys *f f* are arranged on each side of the furnace, as shown in the horizontal sections, figs. 4, 5, and 6, and they are provided with dampers *g g* as shown in fig. 7, for the purpose of regulating the draft and the heat in different parts of the furnace as required. By this means uniformity of heat in the cementing chambers may be obtained. *h h* are adjustable flue valves, which are applied to the openings leading into the slide flues. One of these valves is shown detached in fig. 8, and is represented as capable of the required adjustment by means of a curved rack; *k k* are iron binders, by which the brickwork *a a* is bound together in order to resist expansion. In other respects besides those above referred to the construction of these cementing furnaces is well known, and needs no further description, except to state that in some cases the furnaces may be heated by the waste heat of coke ovens, or the gases generated therein, or by the waste heat of other furnaces. In such cases the heat may be conveyed

from the coke ovens or other furnaces by means of flues passing into the fireplace or chamber underneath the flues of the cementing furnace.

Figures 9 to 14 represent a cementing furnace for the cementation of endless tyers. Fig. 9 is a longitudinal section of the furnace showing a series of cementing chambers *c c* with a number of endless tyers and cementing material contained in one of them; fig. 10 is a horizontal section on the line A B of fig. 9; fig. 11 is a similar section on the line C D, and fig. 12 is a similar section on the line E F, on the same figure; fig. 13 is a plan view showing the top of one of the cementing chambers; and fig. 14 is a transverse section of the furnace on the line G H of fig. 9. The mode of inserting the tyers in the cementing chambers *c c* will be seen on reference to figures 9 and 12, and also the arrangements of the flues. *d d* are flues surrounding the cementing chambers, which flues receive the heat from the horizontal flues *e e*, leading from the fireplaces, and both the flues *d d* and *e e* lead into a circular flue e^1 (see fig. 12), and thence into the general flue e^2, leading to the chimney *f*. The cementing chambers *c c* in these furnaces are circular, and are fitted with movable tops *l l*, as shown. These tops may be lifted off their seats, when required, by means of a crane or hoist by inserting a hook in the ring m. The working and heating of these furnaces are similar to those previously described.

I will now proceed to describe the arrangements of rolls for condensing and hardening the wearing surfaces of railway bars or other articles after they have been withdrawn from the cementing surfaces.

Figures 15 to 17 represent an arrangement of rolls for condensing and hardening the wearing surfaces of railway bars. Fig. 15 is an end elevation, fig. 16 is a plan view, and fig. 17 a side elevation of a suitable frame in which are mounted a pair of vertical rolls, A A, and a pair of horizontal rolls, B B. The upper vertical roll and the two horizontal rolls are adjustable by means of screws, as shewn. In the arrangement shewn the two horizontal rolls and the bottom vertical roll are caused to act as holding and supporting rolls, and the vertical roll alone is adapted for condensing the upper wearing surface of the railway bar C, which is represented as being passed through the rolls after having been drawn from the cementing furnace. It will be seen, on reference to fig. 15, that the upper roll A is capable of being adjusted by means of the screws D D, so as to regulate the degree of pressure to be applied to the surface of the bar C, in order to condense the cemented portion of the bar and produce the required density of the same.

The object of this arrangement of rolls is not to give the required sectional form to the railway bars which are passed through them, but only to condense and harden the cemented or steeled surfaces of such bars by the action of the upper vertical roll A, the arrangement of the remaining rolls being adapted for holding and supporting the bar under operation in such a manner as to secure the bar against alteration in its sectional form by the condensing action of the upper roll.

From the foregoing description of my invention it will be readily understood that the operation of steeling and hardening the wearing surfaces of railway bars, tyres, and axles consists in first placing these articles in the cementing chambers of the furnaces containing a mixture of any carbonaceous matter, as charcoal, by preference, potash, or other alkaline matter, and carbonate or bicarbonate of lime, or matter containing lime. The proportions in which I prefer to use these ingredients are ninety-six parts of charcoal, one part and a half of alkaline matter, *and two parts* and a half of lime by admeasurement, but I do not con-

fine myself to these exact proportions. Then, after the railway bars or other articles have been treated so as to receive the required depth of steel on their surface, they are withdrawn without letting down the heat to any great degree, while the operation of charging and discharging the furnaces is going on, and are introduced without reheating between the sets of rolls A and B, by the action of which rolls the wearing surfaces become condensed and hardened as required.

Instead of using rolls as described, the said wearing surfaces may, if preferred, be condensed by hammering with any convenient arrangement of hammers. Also in some cases it may be necessary to have recourse to reheating the railway bars or other articles after they are withdrawn from the cementing furnaces. I mention this in order to show that while the said furnaces, according to my invention, are constructed so as to admit of the railway bars or other articles being withdrawn and condensed without reheating, these articles may, when necessary, be reheated.

Having thus described the nature of the said invention, and in what manner the same is to be performed, I hereby declare that what I claim as of my invention is—

First. The manufacture and treatment of railway bars, tyres, and axles so as to produce the steeling and hardening of the wearing surfaces by the combined use of the cementing process and the condensing rolls or hammering, as hereinbefore described.

Secondly. The use of cementing surfaces for railway bars and axles, with an arrangement of chimneys, dampers, and adjustable flue valves, as hereinbefore described.

Thirdly. The use of cementing furnaces for tyres constructed, as hereinbefore described.

Fourthly. The use of cementing furnaces as described, whether heated by their own fireplaces or by the waste of coke ovens or of other furnaces.

And, lastly, the arrangement of rolls for condensing the railway bars or other material without reheating after having been previously treated in the cementing furnaces, as hereinbefore described.

Senator CHANDLER. Have you now given us all the information you are able to give as to the Corey patent?

Mr. STAUFFER. The Corey application was assigned to the Carnegie Steel Company, Limited, of Allegheny County, Pa., June 4, 1895, and recorded June, 5, 1895.

Senator CHANDLER. You will insert a copy of the abstract of title.

Mr. STAUFFER. Yes, sir.

The abstract of title referred to is as follows:

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing, found of record up to and including February 26, 1896, under or relating to letters patent granted to William E. Corey, Munhall, Penn., assignor to the Carneigie Steel Company, Limited, June 25, 1895, No. 541594. "Steel armor plate and process of making same."

In testimony whereof I, John S. Seymour, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-eighth day of February, in the year of our Lord one thousand

eight hundred and ninety-six, and of the Independence of the United States of America the one hundred and twentieth.

[SEAL.] JOHN S. SEYMOUR,
Commissioner.

[United States Patent Office. Copy made February 28, 1896.]

Assignor.	Assignee.	Date of assignment.	Date of record.
William E. Corey.....	The Carnegie Steel Company, Limited, Allegheny Co., Pa.	June 4, 1895	June 5, 1895

Invention.	Territory assigned.	Liber.	Page.
Steel armor plates and process of making the same. Appln. exctd. June 4, '95. June 25, '95; 541594.	Exclusive right, title, and interest in said invention. Patent to issue to said assignee. Agrees to execute reissue papers; $1 and other considerations.	Y 51..	219

THE SCHNEIDER PATENTS.

Senator CHANDLER. Are you able to give us any information as to the patents of Henri Schneider?

Mr. STAUFFER. I have copies of two patents to Henri Schneider, of Creusot, France, the first one, No. 415655, dated November 19, 1895, being a process for manufacturing the alloys of steel and nickel.

This invention relates to the manufacture on the hearth or bed of a furnace, as hereinafter described, of steel alloyed with nickel, whereby a product is obtained which is employed in the construction of ordnance, armor plates, gun barrels, projectiles, and other articles for military or other like purposes—commercial sheets or bars, for example. In order to manufacture this combination or alloy of steel and nickel upon a bed or hearth in such a manner as to obtain a homogeneous steel free from flaws or hollows, it is necessary, on the one hand, to avoid oxidizing the nickel before it forms the alloy with the iron, and, on the other hand, it is necessary to cause the incorporation to take place at as early a stage as possible in the operation, or immediately on the commencement of the fusion or liquefaction.

Then he goes on to state—

This alloy may be used in the production of an alloy of steel and nickel, either while yet in the molten condition or after cooling and hardening. The alloy of cast iron and nickel, instead of being formed separately, may be formed in the furnace before proceeding with the subsequent operations, though it is preferred to form it separately. In case it is formed in the furnace itself a bed of anthracite is first prepared in the furnace, and the nickel is placed thereon with the requisite proportion of iron or steel. The whole is then covered with anthracite in order to protect the metal from contact with the air during the fusion. When the charge is melted, the excess of anthracite is removed and charges of iron or scrap are added in succession.

Senator CHANDLER. Please insert a copy of the patent.

The patent referred to is as follows:

[United States Patent Office. Henri Schneider, of Le Creuzot, France. Process of manufacturing the alloys of steel and nickel. Specification forming part of Letters Patent No. 415,655, dated November 19, 1889. Application filed December 3, 1888. Serial No. 292,518. (No specimens.)]

To all whom it may concern:

Be it known that I, HENRI SCHNEIDER, manager of the firm Schneider & Cie., of Le Creuzot, (Saône-et-Loire,) in the Republic of France, manufacturers, have invented Improvements in the Process of Manufacturing the Alloys of Steel and Nickel, of which the following is a specification.

This invention relates to the manufacture on the hearth or bed of a furnace, as hereinafter described, of steel alloyed with nickel, whereby a product is obtained which is employed in the construction of ordnance, armor-plates, gun-barrels, projectiles, and other articles for military or other like purposes—commercial sheets or bars, for example. In order to manufacture this combination or alloy of steel and nickel upon a bed or hearth in such a manner as to obtain a homogeneous steel free from flaws or hollows, it is necessary, on the one hand, to avoid oxidizing the nickel before it forms the alloy with the iron, and, on the other hand, it is necessary to cause the incorporation to take place at as early a stage as possible in the operation, or immediately on the commencement of the fusion or liquefaction. This result is attained, according to this invention, by introducing the nickel by the aid of a preliminary melt or mixture in fusion, containing, say, for example, about thirty per cent. of nickel, sixty-three per cent. of iron, three per cent. of carbon, and two of manganese and silicon, this melt being placed on the hearth or bed of the furnace together with a suitable proportion of iron or scrap-steel.

In my concurrent application of even date, Serial No. 292,520, I have described the production of an alloy of cast-iron and nickel. "This alloy may be used in the production of an alloy of steel and nickel, either while yet in the molten condition or after cooling and hardening. The alloy of cast-iron and nickel, instead of being formed separately, may be formed in the furnace before proceeding with the subsequent operations, though it is preferred to form it separately. In case it is formed in the furnace itself a bed of anthracite is first prepared in the furnace and the nickel is placed thereon with the requisite proportion of iron or steel. The whole is then covered with anthracite in order to protect the metal from contact with the air during the fusion. When the charge is melted, the excess of anthracite is removed and charges of iron or scrap are added in succession." Waste or scrap steel alloyed with nickel obtained by preceding operations is to be employed in these charges, preferably in the first. From this time the operation is conducted on the hearth or open furnace in the same way as in making ordinary steel, care being at the same time taken to continually protect the bath from oxidation by means of a layer of slag or cinder, which is renewed as required, and also to take precautions to prevent redshortness in the metal before the final introduction of the recarbonizing and manganiferous silico spiegel iron or ferro-manganese.

The steel manufactured according to this invention usually contains about five per cent. of nickel—a quantity sufficient to impart a remarkable degree of strength to the product; but the invention is not limited to this proportion.

Steel alloyed with nickel according to this invention is especially adapted or suitable for use in the construction of ordnance, armor-plates gun-barrels, projectiles, and other articles employed for military or other like purposes, or the manufacture of commercial sheets, bars, and the like. The percentages of carbon, silicon, and manganese can be regulated according to the degree of hardness required; but in all cases, in order to obtain the best result possible, the product must invariably be tempered in an oil or other bath.

I claim as my invention—

The herein-described process of manufacturing a homogeneous alloy of steel and nickel by first forming an alloy of cast-iron and nickel rich in the latter metal, as specified, and charging such alloy into a furnace of

the character indicated, with the usual ingredients for the production of steel, and continuing the operation in the ordinary way, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRI SCHNEIDER.

Witnesses:
CHARLES BRÉNOY,
LÉON FRANCKEN.

Mr. STAUFFER. The abstract of title is also submitted.

The abstract of title is as follows:

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing found of record up to and including February 26, 1896, under or relating to letters patent granted to Henri Schneider, Le Creuzot, France, November 19, 1889, No. 415655, "Process of manufacturing the alloys of steel and nickel."

In testimony whereof, I, John S. Seymour, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-eighth day of February, in the year of our Lord one thousand eight hundred and ninety-six, and of the Independence of the United States of America the one hundred and twentieth.

[SEAL.] JOHN S. SEYMOUR, *Commissioner.*

Assignors.	Assignees.	Date of assignment.	Date of record.
Henri Schneider.....	Nickel Steel Syndicate, Limited, London, England.	Mar. 26, 1891	April 13, 1891
The Nickel Steel Syndicate, Limited.	Schneider et Cie., "Société en commandite, sous la dite raison sociale," of Le Creuzot (Saône-et-Loire), France.	Aug. 18, 1892	Dec. 27, 1892

Invention.	Territory assigned.	Liber.	Page.
Process of manufacturing the alloys of steel and nickel, Nov. 19, 1889, 415655.	All the right, title, and interest in said letters patent. Consideration, $5.	T44	83
Process of manufacturing alloys of steel and nickel Nov. 19, 1889, 415655, and other patents.	Entire right, title, and interest in said inventions and letters patent, with all of said assignor's claims for royalties, profits, or damages from past use or infringement, $5 and other considerations.	F47	338

Mr. STAUFFER. The second Schneider patent, No. 415657, is for a process of manufacturing the alloys of cast iron and nickel.

The patent referred to is as follows:

[United States Patent Office. Henri Schneider, of Le Creuzot, France. Process of manufacturing the alloys of cast iron and nickel. Specification forming part of Letters Patent No. 415657, dated November 19, 1889. Application filed December 3, 1888. Serial No. 292520. (Specimens.)]

To all whom it may concern:

Be it known that I, Henri Schneider, manager of the firm Schneider & Cie., of Le Creuzot (Saône-et-Loire), in the Republic of France, manufacturers, have invented improvements in manufacturing the alloys of cast iron and nickel, of which the following is a specification:

This invention has reference to the manufacture on a commercial *scale of cast or pig* iron alloyed with nickel.

Many experiments have heretofore been made with alloys of iron or steel and nickel, and it is known that the addition of a small proportion of the latter metal to the former imparts thereto properties very valuable for certain uses. It is, however, extremely difficult to incorporate nickel with iron and steel, particularly when it is attempted to produce these alloys on a commercial scale. I have discovered that such alloys can be produced by making, as a preliminary product, an alloy or compound of cast-iron and nickel in a crucible, cupola, or open-hearth furnace. This product or alloy, while specially useful for the manufacture of iron and nickel and steel and nickel alloys, may be used for castings for a variety of purposes, and the present application is confined to the production of the cast-iron alloy.

The manufacture of alloys of nickel and steel forms the subject-matter of another application filed December 3, 1888, Serial No. 292,518.

In carrying out my invention I charge a suitable furnace with nickel filings or scrap or waste nickel and ordinary cast or pig iron with carbonaceous matter; or the nickel may be in the form of nickelized compounds or coke. The operation may advantageously be carried on in a reverberatory furnace under a layer of anthracite to avoid oxidation. The alloy, which issues as a direct product of the furnace, contains from five to thirty per cent. of nickel, (though the invention is not limited to these proportions,) and is remarkable for its great elasticity and strength, and also for a true tenacity and malleability—properties which may be still further developed by chilling or tempering in well-known ways. The alloys are consequently suitable for use in the manufacture of castings of all descriptions, and to the production of armor-plates, projectiles, and the like.

I claim as my invention—

1. The herein-described process of manufacturing alloys of cast-iron and nickel by charging a suitable furnace with cast or pig iron, nickel, or a composition containing nickel, and melting together, as set forth.

2. The herein-described process of manufacturing alloys of cast-iron and nickel by charging a suitable furnace with cast or pig iron, nickel, or a nickel compound, and carbonaceous matter, with a superposed layer of anthracite, and melting together, as set forth.

3. The herein-described alloy of cast-iron and nickel rich in the latter metal, said alloy being distinguished by homogeneity, tenacity, capacity for tempering, and by the other characteristics set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRI SCHNEIDER.

Witnesses:
CHARLES BRÉNOY,
LÉON FRANCKEN.

Mr. STAUFFER. The abstract of title of the second Schneider patent is also submitted.

The abstract of title is as follows:

UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the digest of this office of all assignments, agreements, licenses, powers of attorney, and other instruments of writing, found of record up to and including February *26, 1896, under* or relating to letters patent granted to Henri

Schneider, Le Creuzot, France, November 19, 1889, No. 415657, "Process of manufacturing the alloys of cast iron and nickel."

In testimony whereof I, John S. Seymour, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-eighth day of February, in the year of our Lord one thousand eight hundred and ninety-six, and of the Independence of the United States of America the one hundred and twentieth.

[SEAL.] JOHN S. SEYMOUR,
Commissioner.

[United States Patent Office. Copy made February 28, 1896.]

Assignors.	Assignees.	Date of assignment.	Date of Record.
Henri Schneider	Nickel Steel Syndicate, Limited, London, England.	Mar. 26, 1891	Apr. 13, 1891
The Nickel Steel Syndicate, Limited.	Schneider et Cie "Société en commandite, sous la dite raison sociale," of Creuzot (Saône-et-Loire), France.	Aug. 18, 1892	Dec. 27, 1892

Invention.	Territory assigned.	Liber.	Page.
Process of manufacturing the alloys of cast iron and nickel. Nov. 19, 1889. 415657.	All the right, title, and interest in said letters patent. Consideration, $5.	T44...	84
Process of manufacturing alloys of cast iron and nickel. Nov. 19, 1889. 415657 and other patents.	Entire right, title, and interest in said inventions and letters patent, with all of said assignor's claims for royalties, profits, or damages from past use or infringement, $5, and other considerations.	F47...	338

Senator CHANDLER. Wherein does the second Schneider patent differ from the first one?

Mr. STAUFFER. The second patent, as I have said, is also for a process of manufacturing the alloys of cast iron and nickle. The difference, as I see it, is that in the second one the iron and steel are charged into the furnace with carbonaceous material. In the first patent that is omitted.

Senator CHANDLER. And the different process was deemed the proper subject of a new patent?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. There is only one point in reference to these processes about which I wish to be informed. Does the nickel which enters into the armor plate, when these processes are used for making armor, go through the whole plate or is it merely introduced into the surface of the plate? Is there a homogeneous mass of nickel and steel or is there a heavy steel armor plate into the surface of which for some depth nickel is introduced so as to harden the surface?

Mr. STAUFFER. This alloy would be a uniform product—that is, the nickel and steel would be uniformly distributed, or it should be if the alloy is complete.

Senator CHANDLER. Throughout the whole mass of armor plate?

Mr. STAUFFER. Yes, sir.

Senator CHANDLER. Do you understand that to be the fact from an examination of the patents?

Mr. STAUFFER. These patents are not so much for the production of armor plates as for the alloy that may be used therein.

Senator CHANDLER. Is there any description of the use of these *processes as applicable* to armor?

Mr. STAUFFER. Not particularly.

Senator CHANDLER. So you do not discover from the patents whether or not, if the alloys were to be used in making armor, the whole plate would be made of alloy or only the surface of it?

Mr. STAUFFER. I believe there is nothing to show as to that point.

Senator CHANDLER. You may state whether there was any contest over the issue of the Schneider patents.

Mr. STAUFFER. There was over the first one. I have here copies of the examiner's statement of his ground of rejection, the attorney's brief on appeal, and the decision of the examiners in chief.

Senator CHANDLER. Please annex those to your statement.

The papers referred to are as follows:

No. 12815.] UNITED STATES PATENT OFFICE,
October 26, 1889.

Before the examiners in chief, on appeal.

Application of Henri Schneider for a patent for an improvement in the manufacture of alloys of steel and nickel, filed December 3, 1888. Serial No. 292518.

Mr. A. Pollok for appellant.

The claim appealed is:

The herein-described process of manufacturing an homogeneous alloy of steel and nickel, by first forming an alloy of cast iron and nickel, rich in the latter metal, as specified, and charging such alloy into a furnace of the character indicated, with the usual ingredients for the production of steel, continuing the operation in the ordinary way, as set forth.

The references are British patents Nos. 1863, 1861; 3268, 1873; 1194, 1876.

This application is based upon application serial No. 292520 filed concurrently therewith, also on appeal, for a process of manufacturing a homogeneous, tenacious, and temperable alloy of cast iron with a considerable proportion of nickel by charging a suitable furnace with pig iron, nickel, or a nickel compound, and carbonaceous matter, and melting together. This alloy is an ingredient in the present compound, and its formation constitutes the first step of the present process. Having obtained this basis, the next step is to place the alloy upon the hearth or bed of an open-hearth furnace, together with a suitable proportion of iron or scrap steel; or, in case the alloy is formed in the furnace itself, a bed of anthracite is first prepared in the furnace and the nickel is placed thereon with the requisite proportion of iron or steel, when the whole is covered with anthracite to protect the metal from oxidation during the fusion. When the charge is melted, the excess of anthracite is removed and charges of iron or scrap steel are added in succession, preferably nickeliferous scrap steel derived from previous operations. Thenceforward the procedure is the same as ordinarily pursued in making steel by the open-hearth process, care being taken to prevent oxidation by the usual means. The product has been found to possess remarkable and novel fitness for military and naval purposes by reason of its unusual strength, toughness, and durability.

We do not find this process fully set out in either of the references relied on. In the British patent of 1861 the patentee aims only to produce a refined or puddled iron with an infinitesimal proportion of nickel. The metals which he introduces he says "are applied when the iron is in a state of fusion when refining or puddling iron." The provisional specification of 1873 proposes to add about one per cent of nickel to iron *when in a state of fusion*, and he says this cast iron can be afterwards *converted into wrought* iron and steel by any of the known processes.

We do not find in this such a complete and full disclosure of appellan process, either as a patent or a printed publication, as can defeat application for patent for a completely disclosed invention fully reduc to practice.

The British patent of 1876 (Garnier's process), page 11, line 20, referred to. The patentee says:

To obtain these alloys of iron and nickel it is sufficient to combine the cast nic and iron in suitable proportions in the various operations of transformation of cast iron and wrought iron, cast malleable iron and steel.

He mentions the utility of such alloys for military purposes, but does not disclose a clear and practical formula of procedure for th manufacture, much less appellant's specific process herein claimed.

We think appellant can take a valid patent in view of either of the citations. The invention is a very valuable one, not patented, know or used in this country, and its great utility, of which there is am evidence, forms a very strong presumption of novelty in appellan favor. The examiner's decision is reversed.

H. H. BATES,
R. L. B. CLARKE,
Examiners in Chief

(Third member absent.)

[United States Patent Office. In re application Serial No. 292518, Henri Schneider, "Manuf rer of alloys of steel and nickel." Filed December 3, 1888. Before the board of examiners in on appeal.]

EXAMINER'S STATEMENT.

OCTOBER 11, 188

The claim is:

The herein-described process of manufacturing an homogeneous alloy of steel nickel, by first forming an alloy of cast iron and nickel, rich in the latter meta specified, and charging such alloy into a furnace of the character indicated, w the usual ingredients for the production of steel, continuing the operation in ordinary way, as set forth.

The references are: British patents No. 1863, July 24, 1861, Lo maid (treating molten iron, alloys), page 4, lines 23 to 30; No. 3 October 9, 1873, Delatot (alloys), page 2, lines 4 to 10; No. 1194, Ma 20, 1876, Lake (reducing and separating, nickel), page 11, line 20.

All these references describe forming alloys of cast iron and nic which alloys are subsequently used instead of ordinary cast iron in manufacture of wrought iron and steel in the usual manner.

Respectfully submitted.

F. P. MACLEAN,
Examiner, Division II

[Amount received, $10, chief clerk. Henri Schneider, alloys of steel and nickel, filed December 3, No. 292518.]

WASHINGTON, *October 3, 188*

Hon. COMMISSIONER OF PATENTS.

SIR: Appeal is hereby taken to the board of examiners in chief f the decision of the primary examiner rejecting the above-entitled ap cation.

The ground of the appeal is that the references cited by the exami are insufficient in law to constitute an anticipation of applica process.

Respectfully submitted.

A. POLLOK, *Attorney*

(Indorsed:) No. 12815. Serial No. 292518. aper No. 1. Reason appeal. *Filed* October 3, 1889, Henri Schneider. Examiners in ch *October 12, 1889*, U. S. Patent Office.

Senator CHANDLER. State for our immediate information with what inventions, whether American or foreign, the Schneider processes were compared.

Mr. STAUFFER. With several British patents numbered, respectively, 1863 of the year 1861, 3268 of the year 1873, and 1194 of the year 1876.

Senator CHANDLER. Who was the examiner who passed upon the applications?

Mr. STAUFFER. F. P. MacLean. I here file briefs of these British patents.

[British, No. 1863, July 24, 1861. Longmaid, "Manufacture of iron."]

"This invention has for its object improvements in the manufacture of iron, and is peculiarly applicable when refining or puddling iron.

"The invention consists in adding either silver, aluminium, copper, tin, nickel, or magnesium, or compounds of these metals, in very small quantities to iron when it is in a state of fusion while being refined or puddled. If silver or tin or nickel be used, then it is first made into an alloy by melting it with iron or with copper, and the proper proportion of such alloy is introduced into the melted iron when being refined or puddled, or otherwise. When copper is used it is first melted with iron, and the proportion of the alloy is introduced into the iron when it is in a state of fusion. I have found that when an exceedingly small quantity of silver or copper or tin or nickel is introduced into iron when it is in a state of fusion a very marked improvement in the wrought iron thus manufactured is produced, and the quantity of silver should not exceed 10 ounces to the ton of iron, the quantity of copper should not exceed 20 pounds to the ton of iron, the quantity of tin should not exceed 4 pounds to the ton of iron, and the quantity of nickel should not exceed 4 ounces to the ton of iron; and I have reason to believe from the experiments I have made that in all cases the most beneficial results are to be obtained by using these metals in much less quantities than what are above given.

"I am also aware that nickel has been used to alloy iron for special purposes, but in very much larger proportions than I have found useful when alloying iron with nickel for general purposes.

"When I employ nickel in alloying iron, I in no case exceed four ounces of this metal to one ton of iron, and I mix oxide of nickel with a few pounds of iron, in a divided or granular condition (or oxide of iron may be used), with carbon, and fuse the mixture in a crucible, and pour it into an ingot mould; the result will be an alloy of nickel and iron. The ingot thus produced containing a quantity of nickel sufficient for a charge in the furnace, is introduced into the furnace in contact with the iron when in a state of incipient fusion; the manufacture then proceeds in the ordinary manner of refining or puddling iron. The alloyed iron thus produced will be greatly improved in quality."

[British, No. 3268, October 9, 1873. Delalot, "Manufacture of iron and steel."]

"The object and intention of this invention is to render iron and steel proof against rust when exposed to the action of the atmosphere, water, or other natural oxidizing agent.

"The means by which I propose to accomplish the above object are as follows: I take iron or steel, and having placed it in a suitable vessel or cupola, proceed to melt it to a liquid or semifluid state by subjecting it to that point of fusion commonly practiced for casting into moulds or ingots. I then add thereto nickel in the following proportions of the

nickel to the iron or steel: To every 220 pounds 6 ounces of iron or steel I add 2 pounds 3 ounces and 3 drachms of nickel, or as near as may be 1 part, by weight, of nickel to every 100 parts, by weight, of iron or steel. After these two metals have been in contact for 10 or 15 minutes they will have become thoroughly mixed and incorporated, when the molten mass can then be run into moulds or ingots.

"Cast iron treated in the above manner can afterwards be converted into wrought iron and steel by any of the known processes, and will be found equal in quality to iron and steel as heretofore manufactured by the most approved processes, and will only differ therefrom by having acquired the novel and peculiar property of being perfectly inoxydizable or not capable of being injuriously affected by the action of the atmosphere, water, or other of the common oxydizing agents or influences which now oxydize iron and steel as heretofore manufactured.

"I would here observe, that instead of employing nickel only, the nickel may be mixed with cobalt in about equal proportions by weight of each of these ingredients, or cobalt only may be employed instead of the aforesaid mixture of nickel and cobalt, in which latter case I use the cobalt in the same proportion to the iron or steel as when using nickel or nickel mixed with cobalt, namely, about one part of cobalt to every 100 parts of iron or steel."

[British, 1194, March 20, 1876. Lake, "Manufacture of nickel from its oxides, &c."]

The first part of the specification relates to obtaining pure nickel.

The nickel ore is sorted, washed, ground fine, mixed with a flux, such as calcium carbonate, fluor spar, borax, white glass, etc., and with coal dust, lamp black, or other reducing substance. The mixture is then agglomerated with some binding material, as tar, resin, oil, etc., reduced in crucibles, blast furnace, muffle furnace, or reverberatory furnace, and then cast into ingots.

The manufacture of ferro-nickel or the introduction of nickel in the condition of an alloy of iron in the metallurgy of iron is as follows: There have been several reasons up to the present time against employing alloys of iron and nickel, the principal one being that nickel was too rare and too costly to enter into commercial metallurgy of iron; moreover, the nickel of commerce being always mixed with copper, sulphur, arsenic, and like matters, which it is well known, when in the presence of iron, render the latter brittle, and the alloy also, of which it forms a part. This difficulty explains the divergence of opinions held and the rare attempts which have been made to alloy nickel with iron for manufacturing purposes. But with "garnierite" these inconveniences no longer exist; the abundance of the ore and its purity certainly remove the obstacles which I have pointed out as regards the production of alloys of iron and nickel. Moreover, instead of trying to remove the iron from the nickel ores as heretofore, I allow it to remain in these ores, and I add some as above described, but only in cases where I have not to produce an alloy containing metals which mix badly with iron, such as copper.

The employment of cast iron, melted iron, and steel alloyed to a proportion of nickel variable according to circumstances, forms an important feature of this invention. The nickel which I add improves the qualities of the iron, whether with regard to resistance, malleability, or inoxidability. To obtain these alloys of iron and nickel it is sufficient to combine the cast nickel and iron in suitable proportions in the various operations of transformation of the cast iron and wrought iron,

cast malleable iron, and steel. I employ this cast iron and nickel for art castings. The wrought iron, malleable cast iron, and steel with nickel, which I call ferro-nickel, serve advantageously for the manufacture of barrels of firearms, ordnance, knife blades, swords, and the like, chain cables, cables but slightly subject to oxidation for coal mines, nails for ships, and like purposes, it being understood that in these various cases the yield in nickel of the ferro-nickel will vary according to the desirability of more or less high degree of tenacity, malleability, and inoxidability.

With regard to plates for boilers I would remark that the plates which are now used of cast iron or steel, and even those of puddled iron, deteriorate rapidly; inside of the boiler they become oxidized under the influence of the pressure of heat and of contact with water, especially when they contain manganese. With the ferro-nickels these deteriorations will be much less rapid.

Castings with a base of nickel and iron will also be necessary for my various alloys, with a base principally of nickel and iron, and the said invention comprises the manufacture of this casting or melting by a simple addition, either in blocks or otherwise, of New Caledonian nickel ore in the fusion bed of blast furnaces such as now used. Through these blast furnaces, also, the scoria and dross may be passed.

Mr. STAUFFER. I also furnish a similar statement as to the second case. It was appealed, and I have a copy of the examiners' statement, the attorney's brief on appeal, and the examiners' ground of decision.

Senator CHANDLER. That is exactly what we want.

Mr. STAUFFER. I will hand the papers to the reporter. Some of the references are the same in each case.

The papers referred to are as follows:

No. 12817.] UNITED STATES PATENT OFFICE,
October 26, 1889.

Before the examiners in chief, on appeal.

Application of Henri Schneider for a patent for an improvement in the manufacture of alloys, etc., filed December 3, 1888. Serial No. 292520.

Mr. A. Pollok for appellant.

The claims appealed are:

1. The herein-described process of manufacturing alloys of cast iron and nickel by charging a suitable furnace with cast or pig iron, nickel, or a composition containing nickel, and melting together, as set forth.

2. The herein-described process of manufacturing alloys of cast iron and nickel, by charging a suitable furnace with cast or pig iron, nickel, or a nickel compound, and carbonaceous matter, with a superposed layer of anthracite, and melting toegether, as set forth.

3. The herein-described alloy of cast iron and nickel, rich in the latter metal, said alloy being distinguished by homogeneity, tenacity, capacity for tempering, and by the other characteristics set forth.

The references are: British patents Nos. 2296 of 1799; 10971 of 1845; 163, 1861; 3268, 1873; 1194, 1876; German patent No. 28924 of 1884.

The applicant sets out with the admission that many experiments have heretofore been made with alloys of iron and steel with nickel, which have been so far successful as to indicate the high value which such alloys would have for many purposes in the arts. He denies, however, that such experiments have ever been carried forward to completeness in practical form so as to afford to the public either a useful commercial product or the information requisite to put such a product

on the market. He claims to have for the first time reduced such invention to practical form, and those who have seen the product and its tests at the Creuzot works in France, among whom is the officer of the U. S. Navy through whom the Government derived its information, bear witness to its extreme value and practical novelty. Appellant having thus fully reduced his invention to practice would occupy the same position, as prior inventor in the patentable sense, against mere former scientific theories or laboratory experiments, as though he were contestant in an interference proceeding to determine priority of invention under the same state of facts.

The present application for making a homogeneous temperable alloy of iron rich in nickel is subsidiary to the final process for making a steel and nickel alloy suitable for armor plates of vessels, but none the less important on that account. The success of appellant's results on the large scale pursued by him are no doubt attributable to the peculiarity of his mode of procedure, in which lies the main patentable feature. He specifies that he charges into a suitable furnace, cupola, open hearth, crucible, scrap or waste nickel or nickeliferous compounds with pig iron and carbonaceous matter. The metals are fused together in the presence of the carbonaceous matter, and flow as a direct product of the furnace in the form of a homogeneous alloy while melted. The most important use so far discovered of this product is as an element in the formation of nickeliferous steel, analogous to the use of spiegeleisen, for the production of armor plates for vessels of very high resistant quality.

A number of references are cited against both the process and the product. The first is the British patent No. 2296, 1799. This patent proposes to fuse together cast iron and nickel in certain varying proportions to cast culinary vessels from. No process except this hint of fusion is disclosed, and it is denied that the resulting mixture would be an alloy.

The British patent No. 10971, 1845, proposes to add copper, tin, nickel, or antimony to cast iron "while fluxing," to hinder its oxidation and render it less brittle. No other process is described.

The British patent No. 1863, 1861, proposes to add various metals in homeopathic quantities to iron, among which nickel is mentioned. The nickel is to be introduced into the iron when it is in a state of fusion (different process), and the amount is specified not to exceed 4 ounces to the ton of iron—an inappreciable quantity as an alloying substance.

The British patent, No. 3268, 1873, received provisional protection only, and proposed to reduce the tendency of iron to rust by introducing into it, when in a state of fusion, about one per cent of nickel. The process is not appellant's process, and the product is not "rich in nickel," nor distinguished by the properties claimed for appellant's alloy.

The British patent, No. 1194, 1876, relates to the manufacture of nickel and its alloys from its oxides, or silicates, or other salts (Garnier's process). When the alloy of iron with nickel is the subject of treatment, he fuses together the oxides of the said metals, or he adds to a bath of metallic nickel on a hearth solid ingots of iron, either cold or heated, or iron in a melted condition, in ladles. These alloys, called ferro-nickel, are undoubtedly rich in nickel, and they are described as being valuable for many useful purposes, but it is not clear that they possess all the distinctive properties of appellant's product, and, being derived by a different process, the benefit of the doubt as to identity of product *should be given to* appellant.

The German patent, No. 28924, 1884, relates to a mixture of iron or

steel and nickel, said to be adapted as an anode for the electroplating of metals, but it is not necessarily an alloy.

The most pertinent reference is undoubtedly the Garnier patent of 1876, which deals primarily with ores of nickel very rich in the metal, and contains many suggestions regarding the preparation of its alloys, but these alloys do not appear to have ever become practically known and used on a scale at all commensurate with their vast utility, had they ever been actually produced. In view of the great practical results already achieved by appellant, and their importance in national defense, now for the first time disclosed, we think that the benefit of every doubt should be given him in respect to the grant of letters patent "ut res magis valeat quam pereat." We therefore reverse the examiner's decision.

H. H. BATES,
R. L. B. CLARKE,
Examiners in Chief.

Third member absent.

(Indorsed:) No. 12817. Serial No. 292520. Paper No. 4. Decision filed October 26, 1889. Henri Schneider. Examiners in Chief, October 26, 1889, U. S. Patent Office. Recorded, vol. 36, p. 391.

[United States Patent Office. In re application, Serial No. 292520, Henri Schneider. "Manufacture of alloys of iron and nickel." Filed December 3, 1888. Before the board of examiners in chief on appeal.]

EXAMINER'S STATEMENT.

The claims rejected are:

1. The herein-described process of manufacturing alloys of cast iron and nickel by charging a suitable furnace with cast or pig iron, nickel, or a composition containing nickel, and melting together, as set forth.
2. The herein-described process of manufacturing alloys of cast iron and nickel by charging a suitable furnace with cast or pig iron, nickel, or a nickel compound and carbonaceous matter, with a superposed layer of anthracite, and melting together, as set forth.
3. The herein-described alloy of cast iron and nickel, rich in the latter metal, said alloy being distinguished by homogeneity, tenacity, capacity for tempering, and by the other characteristics set forth.

The references upon which the rejection is based are, against claims 1 and 2: British patents No. 2296, February 28, 1799, Hickling (treating molten iron, alloys); No. 1194, March 20, Lake, 1876 (reducing and separating nickel); No. 1863, July 24, 1861, Longmaid (treating molten iron, alloys), and No. 3268, October 9, 1873, Delatot (alloys).

Against claim 3: German patent No. 28924, September 18, 1884, Fleitmann (reducing and separating), and British patent No. 10971, November 27, 1845, Poole (cementation and case hardening).

The patent to Hickling describes fusing cast iron and nickel together (page 3, lines 30 to 35). Longmaid's patent describes forming an alloy of cast iron and nickel, which is subsequently used in the manufacture of wrought iron (see page 4, lines 23 to 31).

The patent 1194 of 1876 also describes such alloys (see page 11, lines 1 to 34), as do 10971 of 1845 (page 2, lines 10 to 14, lines 27 to 32), and 3268 of 1873.

The German patent 28924 describes an alloy of iron or steel and nickel, which it expressly states is perfectly adapted for plating metal.

In view of these references there seems to be no patentability in either the process or the product.

Respectfully submitted.

F. P. MACLEAN,
Examiner, Division III.

(Indorsed:) Serial No. 292520. Paper No. 2. Examiner's statement *filed Oct. 12, 1889. No.* 12817, Henri Schneider. Examiners in chief, *Oct. 12, 1889, U. S.* Patent Office.

[Amount received, $10. Chief clerk. Henri Schneider, alloys of cast iron and nickel, filed December 3, 1889. No. 292520.]

WASHINGTON, *October 3, 1889.*

Hon. COMMISSIONER OF PATENTS.

SIR: Appeal is hereby taken to the board of examiners in chief from the decision of the primary examiner finally rejecting the above application.

The ground of appeal is that the references cited by the examiner are insufficient in law to constitute an anticipation of applicant's invention, and that applicant's process and the alloy resulting therefrom are novel and patentable.

Respectfully submitted.

A. POLLOK, *Attorney.*

(Indorsed:) No. 12817. Serial No. 292520. Paper No. 1. Reasons of appeal filed October 3, 1889. Henri Schneider. United States Patent Office, October 3, 1889, chief clerk. Examiners in chief, October 12, 1889, United States Patent Office.

[British No. 163, Jan. 21, 1861, "Manufacture of cast steel." Mushet.]

"My present invention consists in improving cast steel by adding to the said cast steel in the melting pot or crucible granulated pig iron, cast iron, or refined iron, mixed with pulverized titanium ore, or titanic acid, or oxide of titanium, and melting the said cast steel and the said mixture of pulverized titanium ore or titanic acid, or oxide of titanium and granulated pig iron, cast iron, or refined iron together in a melting pot or crucible, or adding the said mixture of pulverized titanium ore or titanic acid, or oxide of titanium and granulated pig iron, cast iron, or refined iron together in a melting pot or crucible, or adding the said mixture of granulated pig iron, or refined iron and pulverized titanium ore or titanic acid or oxide of titanium to and melting it with any mixture of materials which when melted produces cast steel. Instead of using titanium in an oxidized state, the said titanium may be employed in a reduced or metallic state as hereinafter more fully explained.

"The ores of titanium I prefer to employ for my process are iserine and ilmenite, and which are also termed titaniferous iron ores, as these ores are found in great abundance, can be cheaply procured, and afford excellent results; but other ores of titanium and titanic acid or oxide of titanium may nevertheless be used for my process. Iserine contains from eight to twelve per centum of titanic acid, the residue being chiefly oxide of iron. Ilmenite contains from twenty to fifty per centum of titanic acid, the residue being principally oxide of iron.

"I prepare the ores of titanium for my process by pulverizing them so as to pass through a sieve of from 1,600 to 4,900 meshes per square inch, observing that the finer the said ores are pulverized the better are they adapted for my purpose, but I do not confine myself to any specific degree of pulverization of the said ores.

"I prepare the pig iron or refined iron for my process by granulating the said iron in any convenient manner.

"To one pound of pulverized ilmenite or iserine I add from five to fifteen pounds of the granulated pig iron or cast iron, or from ten to twenty-five pounds of the granulated refined iron, and I mix the pulverized titanium ore and the granulated ore thoroughly. I do not, however, confine myself to the relative proportions of pulverized ore of titanium to granulated pig, cast, or refined iron herein set down, *these may be* varied without departing from the nature of my

tion, but I have found in practice that these proportions afford excellent results.

"When pig iron or cast iron granulated is mixed with pulverized ilmenite or iserine, as herein described, I call the mixture No. 1; and when granulated refined iron is mixed with pulverized ilmenite or iserine in the manner I have herein described, I call the mixture No. 2; and these mixtures, namely, No. 1 and No. 2, are ready for use in my process.

"When in carrying my invention into effect I operate upon steel or upon any mixtures of steel of various descriptions, I take the said steel or mixtures of various steels when they are about to undergo the process of melting into cast steel and I treat them in the following manner: When blister steel, bar steel, scrap steel, puddled steel, or cast steel of any description cut or broken up for the purpose of remelting, or any mixtures of the said varieties of steel with each other, or with malleable iron, or with carbonaceous matter, or with both malleable iron and carbonaceous matter in such proportions as to produce, when melted, cast steel, are intended to be melted in a melting pot or crucible placed in a suitable melting furnace and heated therein, in each case I introduce into the melting pot or crucible a quantity of mixture No. 1 or of mixture No. 2 along with the steel, or mixtures of steel with each other, or with malleable iron, or with carbonaceous matter, or with both malleable iron and carbonaceous matter, and I heat the said substances in the melting pot placed in a suitable melting furnace until the mixture No. 1 or No. 2, as the case may be, and the steel in the melting pot are melted and combined. I then withdraw the melting pot from the furnace and pour the steel into an ingot mould or other suitable mould.

"The quantity of the mixture No. 1, or of the mixture No. 2, which I add to forty pounds of steel, or of any such mixture of materials as when melted produces cast steel, may be varied; but in practice I have found that from five pounds to fifteen pounds of No. 1 mixture and from ten pounds to twenty-five pounds of No. 2 mixture, when added to forty pounds of steel, or of any such mixture of materials as when melted produce cast steel, afford very excellent results; but I do not limit myself to these proportions, which may be varied without departing from the nature of my invention. Reduced or deoxidized titanium ores or compounds containing titanium in a metallic or partially metallic state may be used for the titanium ores.

"Having thus described the nature of my invention and the manner in which I prefer to carry my said invention into effect, I declare that my invention consists, firstly, in adding in the melting pot or crucible, to steel or to any mixture of materials which when melted produce cast steel, a mixture of granulated pig iron, cast iron, or refined iron and pulverized titanium ore, titaniferous iron ore, titanic acid, or oxide of titanium, and melting the said cast steel or steel-producing materials and the said mixture of granulated pig, cast, or refined iron and pulverized titanium ore, acid, or oxide together in the said melting pot or crucible, in order to alloy the titanium or a portion of the titanium contained in the said titanium ore, acid, or oxide with the cast steel melted from the steel or mixtures of steel-producing materials operated upon, so as to produce thereby an improved quality or qualities of cast steel.

"My invention consists, secondly, in adding to steel or any mixture of materials which when melted produce cast steel, a mixture of granular pig, cast, or refined iron, and metallized deoxidized ilmenite, or compound ore of titanium and iron, and melting the said steel or the

said steel-producing materials and the said mixture of metallized deoxidized ilmenite, or compound ore of titanium and iron and granular pig, cast, or refined iron together in a melting pot or crucible, in order to improve the quality of the cast steel obtained."

[British, No. 10971, Nov. 27, 1845, Poole, "Combining iron with other metals, to prevent oxydation and rendering malleable iron more hard and durable."]

The processes described are as follows:

"First, the mixture of copper, tin, nickel, or antimony may be added in any form or manner to cast metal whilst fluxing, so as to get it mixed evenly through the molten mass, and the proportion of two to ten per cent of the said metal or metals may be varied to suit the various purposes for which the said cast metal may be applied; the more of these metals, up to ten per cent, that is added, the less oxidizable and less brittle the compound will be.

"My second improvement consists in the coating of malleable or wrought iron with steel, or with the above-named mixture of metals, which will be found particularly useful for axles of wheels or other forms of iron subject in their use to great friction. A furnace may be employed of any form capable of melting cast metal; but if the fire plays over the surface of the metal, a flux composed of lime, alumina, sand, or any other substance generally used for such purposes, is to be used with the metal, to prevent the action of the fire on the metal; but a more convenient mode (where the form of the piece of iron to be coated will allow it) to be employed is to melt the metal in a crucible placed in a furnace with coke, the same as is used by the makers of cast steel and by brass founders; and for an axle or any other form of iron requiring a particular form or thickness of the harder metal to be cast upon it, a crucible may be used of the particular form and size so required, and made so as only to allow the particular thickness of metal required to be cast round it, and which, when properly melted and finished as hereinafter to be described, it may be left to cool without removing the crucible, which when cool may be broken off, leaving the iron with its covering of the form and thickness of coating required. The furnace and vessel to contain the molten metal being prepared, a description of steel is to be made in the following manner:

"Common pig metal or any form of carburetted iron is put in and melted, a portion from time to time of malleable or scrap iron is added, until, by dipping (into the molten mass) a rod of malleable iron no action or corrosive effect on the rod is observed; a little oxide of manganese may be added with the scrap iron, as it is known to have a good effect in making common steel. With some sorts of cast metal this corrosive effect is so great as even to dissolve quickly (to a fine point) the rod of iron introduced. Or the said molten metal may be formed of common blister steel and pig metal; the proportion of one-half to double the quantity of cast steel to that of pig metal may be used, according to the hardness of the steel coating required; or indeed any composition of steel now known may be used, the invention consisting in these instances not of the mixture of metal forming the steel, but to the application of it in covering malleable or wrought iron, and to the manner of doing it. Any addition of tin, copper, nickel, or antimony, varying from two to ten per cent, may be used with the above, and in most cases two per cent is sufficient. It is indeed impossible to advise or describe one best mixture of the coating metal, because it depends upon the use the coating is to be applied to. Thus, for axles *of railway carriages* subject to violent concussions, a mixture of tin

or copper, &c., with the steel will be found highly useful; but where the effect of friction alone is to be prevented, as in a stationary engine, the hardest steel will be best in all these mixtures. However, the molten mass must be tried by an iron rod to see if any corrosion of the rod takes place (which will almost always be found to be the case with common cast metal); otherwise the coating will never adhere as one mass with the coated metal; and in case corrosion is observed pieces of scrap iron must be added as before named.

"The molten mass being thus prepared, the piece of iron to be coated must be dipped into the mass and left to remain until it becomes of the same high heat as the molten metal, or it may be heated previous to dipping it in, but in case a crucible is used only containing a small quantity of the coating metal, the piece of wrought iron, when introduced cold will harden and cool the mass, but the heat must be contin ued until the metal again becomes fluid, by which means the two metals will unite as in one mass, and which, if well done, cannot be detached when cold, although the piece of iron be hammered nearly flat.

"After the steel coating is cast on over the iron, it may be gradually cooled, turned, and polished, and again hardened up by heating, and rapidly cooling the same, as in the working steel, with this precaution, that if the coating is thick, from the steel and iron having different degrees of dilation in cooling, if plunged at once red hot into cold water, it is apt to crack; it must be more gradually cooled. In the case of an iron axle only coated at the end, the iron may be plunged hot into water up to where the coating commences, leaving it out of the water, the conducting power of the iron will cool the coated part sufficiently rapid to give the necessary hardness."

The remainder of the patent relates to the ordinary method of case hardening iron.

[Translation, German patent. E. Sz. 2, 28, '96. Published September 18, 1884.]

Imperial Patent Office. Specification No. 28924. Class 40, metallurgy. Dr. Th. Fleitmann in Iserlohn. Improvement in the process patented under Numbers 7569, 13304, and 14172 for welding iron, steel, copper, and the alloys of the latter with nickel, cobalt, and their alloys. Fourth addition to patent No. 7569, of December 15th, 1878. Patented in the German Empire January 6th, 1884. Longest duration, December 14th, 1893.

The inventor has observed that pure nickel, as well as the alloys of the same with copper, cobalt, and iron, that form the subject of his patents Nos. 7569, 13304, and 14172, may receive the most varied additions of other metals without thereby losing its capacity for welding, on which his process of plating rests. He has discovered, namely, that zinc, tin, lead, cadmium, iron, and manganese up to 10 per cent and over, and silver in any proportion, can be added to the alloys of copper and nickel without the applicability to the process of plating being entirely lost. Similarly he has found that pure nickel can stand these additions, with the exception of the very volatile cadmium, up to the above proportions, without losing its capacity for welding. The alloys of nickel and cobalt with iron and also steel can even be made in any proportion without losing their capacity for being plated on iron and steel.

All the above-mentioned additions are, as I know, of no practical value and even decrease the welding capacity of the plating metals; that is, render more difficult the process of plating with the exception of the addition of silver to the nickel copper alloy and of iron to pure nickel, which *latter metal*, having by nature great welding capacity, in

nowise diminishes the welding capacity of nickel and poss great advantage of making the plating metal considerably Even the alloy of 25 per cent nickel and 75 per cent iron show color very different from the iron and offers much greater resi atmospheric influences than pure iron.

CLAIMS.

1. The addition of tin, lead, cadmium, iron, and manganes per cent and silver in any proportion to plating metals hith as designated in patents Nos. 7569, 13304, and 14172.

2. The use of alloys of nickel and cobalt with iron and s proportions down to 5 per cent of nickel and cobalt for plati welding process.

At 1.30 o'clock p. m. the committee adjourned.

SATURDAY, *March 1*

The committee met at 10.30 a. m., with Senator Hale as act man.

Commodore Philip Hichborn, Chief of Bureau of Constru Repair, Navy Department; J. F. Meigs, lieutenant, United Sta retired, and C. A. Stone, lieutenant, United States Navy appeared.

STATEMENT OF PHILIP HICHBORN, CHIEF CONSTRUCTOR STATES NAVY.

Senator CHANDLER. Mr. Hichborn, what is your rank an in the Navy and in the Navy Department?

Mr. HICHBORN. Chief constructor, with the rank of comm

Senator CHANDLER. The chief constructor is at the hea bureau of the Department?

Mr. HICHBORN. Chief of the Bureau of Construction and

Senator CHANDLER. How long have you held that office?

Mr. HICHBORN. It will be three years next July.

Senator CHANDLER. What was your connection with th before you became the chief?

Mr. HICHBORN. I was assistant to the chief constructor.

Senator CHANDLER. And had been for how long a period?

Mr. HICHBORN. For about ten years previous to being chief constructor.

Senator CHANDLER. How long have you been in the nava

Mr. HICHBORN. Since I first entered as an apprentice boy, years ago.

Senator CHANDLER. What have been your successive p since that time?

Mr. HICHBORN. I passed through the grades of apprentice

Senator CHANDLER. In the construction department?

Mr. HICHBORN. In the construction department entirely. from the grade of apprentice boy to a draftsman; from dra master shipwright; from master shipwright to assistant n structor; from assistant naval constructor to naval constru naval constructor to chief constructor.

Senator HALE. Chief of the Bureau?

Mr. HICHBORN. Chief of the Bureau of Construction and

Senator CHANDLER. And ceasing to be chief of the Bureau you would continue to hold your rank as naval constructor?

Mr. HICHBORN. As naval constructor. I have about five years more before reaching the age limit of 62.

Senator CHANDLER. State, with reference to the battle ships of the Navy which have been built under contract, in how many cases has the contractor furnished the armor, and in what cases has the Department furnished the armor to the contractor to be placed upon the ship.

Mr. HICHBORN. I do not know of any exception. The Government has always supplied the armor for the new ships.

Senator CHANDLER. The contracts, then, for the battle ships have been, first, a contract with the builder for the hull of the ship, without the armor?

Mr. HICHBORN. Independent of the armor.

Senator CHANDLER. Then the Government has made a contract for the armor?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. And has caused that armor to be delivered to the contractor, to be put in position on the hull of the ship? Is that the way?

Mr. HICHBORN. It is the contractor's duty to furnish the plans and templates to the armor men. Then, after the armor is delivered, he has to fit it and place it and secure it in position. The Government has to deliver it at such place in the shipyard as the shipbuilder may designate. That is about the way the contract reads. A copy of the contract for the *Kentucky* is submitted, in which I have marked for quotation the following:

"Third. The party of the first part will, as rapidly as possible, furnish all working drawings and templates necessary to show the dimensions and shape of each and every armor plate required for use in the construction of the vessel, including those to be used in the construction of the side and diagonal belts, turrets, barbettes, casemates, conning towers, ammunition tubes, and protection for the guns and loading positions, and the position and sizes of the bolt holes therein, the spacing and dimensions of said bolt holes to be in accordance with the specifications and subject to the approval of the Secretary of the Navy; it being expressly understood and agreed that the party of the first part shall furnish all the armor, armor bolts, and their accessories required in the construction of the protective deck; that the party of the second part shall furnish all other armor, armor bolts, and their accessories to be used in the construction of the vessel, including such as may be required in the construction of the side and diagonal belts, turrets, barbettes, casemates, conning towers, ammunition tubes, and protection for the guns and loading positions, trim such armor plates to the drawing or template sizes and shapes, within reasonable manufacturing limits, as set forth in the specifications, and drill and tap all armor bolt holes therein, as shown by said approved drawings and templates, and deliver said armor, armor bolts, and their accessories, at the shipyard of the party of the first part, and within the times and in the order required to carry on the work properly; and that the party of the first part shall, at its own risk and expense, furnish all rivets and other fastenings, and drill, tap, and fit all holes for rivets and other fastening used to connect any part of the hull framing to the armor for constructive purposes, except as hereinbefore mentioned, and properly fit, fix, place, and secure to the vessel all the armor, including the side and diagonal belts, turrets, barbettes, casemates, conning towers, ammunition tubes, and protection for the guns and loading positions, as

required by the aforesaid drawings, plans, and specifications; and it is expressly understood, covenanted, and agreed that if, upon the completion of the vessel, except the fitting, fixing, placing, and securing of the armor for her side and diagonal belts, turrets, barbettes, casemates, and conning towers, the party of the second part shall not have commenced the delivery of such armor to the party of the first part, then and in such case the vessel shall be subjected to the trial provided for in the tenth clause of this contract, and if, at and upon such trial, all the conditions and requirements relating thereto, except as to the fitting, fixing, placing, and securing of the armor for the side and diagonal belts, turrets, barbettes, casemates, and conning towers, shall be fulfilled, the vessel shall be accepted as provided for in the eleventh clause of this contract; and if the party of the second part shall not have commenced the delivery of the armor for the side and diagonal belts, turrets, barbettes, casemates, or conning towers when the vessel is ready for her final trial, or within five months after either a preliminary or a conditional acceptance of the vessel, said vessel shall be finally accepted, subject to the conditions and requirements of this contract, and the cost of fitting, fixing, placing, and securing the armor for the side and diagonal belts, turrets, barbettes, casemates, and conning towers shall be ascertained, estimated, and determined by a board of naval officers appointed by the Secretary of the Navy; the party of the first part shall be bound by the determination of said board, and such cost shall be deducted from the price of the vessel in the final settlement under this contract; but if the party of the second part shall commence and continue with reasonable diligence the delivery of the armor for the side or diagonal belts, turrets, barbettes, casemates, or conning towers of the vessel prior to her final trial, or within five months after either a preliminary or a conditional acceptance of the vessel, the party of the first part shall fit, fix, place, and secure all the armor to the vessel in accordance with the requirements of this contract and the drawings, plans, and specifications hereto annexed."

Senator CHANDLER. Has the question recently arisen at the Department whether this method is better than to have the contractor with the Government build the ship and furnish the ship fully armored, he making his purchases of armor from the armor manufacturers? Has that question arisen and been discussed at the Department?

Mr. HICHBORN. Yes, sir; it came up on the last two ships, the *Kearsarge* and the *Kentucky*. The Bureau raised that question.

Senator CHANDLER. State what Bureau.

Mr. HICHBORN. The Bureau of Construction. I am speaking of that Bureau. The Bureau of Construction raised that question.

Senator CHANDLER. In what way was it raised?

Mr. HICHBORN. By a letter to the Secretary of the Navy, a copy of which I have with me.

Senator CHANDLER. You may state, in the first place, by way of narration, what has taken place, and after that you may hand the reporter any copies you have from the records showing the transactions.

Mr. HICHBORN. The idea of the Bureau in suggesting that the contractor be called upon to supply the armor with the ship originated from the belief that a ship could be built more quickly if the contractor had the entire control of the armor or the supplying of the armor the same as he supplies the rest of the vessel. The armor is a part of the ship, and we had in view the fact that if private builders were going to build ships for foreign countries they would have to make some *arrangement by* which they could supply the armor for those ships. I

gave the question the first thought when it came up for building ships for China, Japan, or any other nation. It would save time, because the shipbuilder would deal directly with the armor maker instead of having the matter travel all around through two or three different bureaus, as it does at the present time.

Now, I will give you an illustration of how we have to deal with the armor question. The contract is made for the ship and the machinery, the contract requiring that the plans for the armor shall be supplied to the armor maker by the ship contractor. The Government enters into the contract with the armor maker for the armor, and then awards or orders that the Bureau of Ordnance, a bureau entirely different from the shipbuilding department, shall have control of the inspection and reception of the armor.

The notice that I received from the committee said something in regard to an armor plant. Had I known the questions were going to be so general, I would have become a little more familiar with these points, but at the same time I will try and make myself understood.

Senator CHANDLER. Go on, if you desire to elaborate your argument in favor of having the contractor for the ship furnish the armor.

Mr. HICHBORN. We will say that the contracts are all made for the ships and for their armor, and we start out to supply both the ship and the armor. In the first place, the shipbuilder must supply the drawings for the armor. After he prepares his drawings he sends them to the superintending constructor, who is under the Bureau of Construction and Repair. The superintending constructor sends those plans to the Bureau of Construction and Repair. The Bureau of Construction and Repair goes over them, examines them carefully, and sees if there is any discrepancy in the measurements, and then makes four blue prints of those tracings. After doing that, we send them to the Bureau of Ordnance. The Bureau of Ordnance sends them to the armor contractor. All at once it is discovered that there is some little irregularity in the drawing, or something that needs changing, and they travel all the way back again from the armor maker to the Chief of Ordnance, from the Chief of Ordnance to the chief constructor, from the chief constructor to the superintending constructor, and from the superintending constructor to the shipbuilder.

Senator HALE. The contractor?

Mr. HICHBORN. Yes, the contractor. Sometimes it is only a few figures that have to be changed, or something that if the shipbuilders were right on the ground they could fix themselves. I have known, in the case of the *Oregon*, months to be occupied in correspondence on a small matter.

Senator CHANDLER. This was one of your objections? Do you wish to state the others, or do they appear from the correspondence?

Mr. HICHBORN. My letter to the Secretary of the Navy will explain it, I think, a little better.

Senator CHANDLER. Before putting in your letter, state historically what has happened in the Department, how the question has been raised, by whom it has been discussed, and how it was settled.

Mr. HICHBORN. After the letter was sent to the Secretary, as I understand the case, the Department started to get out proposals in two ways, one to have the Government furnish the armor, and the other to have the contractor furnish the armor and complete the ship with the armor all in place.

Senator CHANDLER. As you had recommended?

Mr. *HICHBORN. As I had recommended.* That went on for a time,

probably for a month or so. I understood there was a conference between the armor makers and the Secretary of the Navy in regard to the question, and I afterwards learned from the printed proposals that they reverted to the old method.

Senator CHANDLER. Were the proposals printed in both ways or in only one way?

Mr. HICHBORN. It was proposed to have them both ways, so that the shipbuilder could bid under either the old method or the new.

Senator HALE. You use the word "shipbuilder" for contractor?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. So that the contractor could bid for the whole ship, or the ship without the armor?

Mr. HICHBORN. For the whole ship, or the ship without the armor.

Senator CHANDLER. And the proposals were drawn up in that way?

Mr. HICHBORN. They were prepared in that way, but they were never issued.

Senator CHANDLER. They were put in order at the Navy Department in that way?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. While this question was pending?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. Had a decision been made by the Secretary to have them drawn up in that way or were they only drawn up tentatively?

Mr. HICHBORN. They were drawn up by his direction.

Senator CHANDLER. And decision?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. Then you understand the decision was made to advertise that way, and it was reversed afterwards?

Mr. HICHBORN. Yes, sir; it was reversed afterwards.

Senator CHANDLER. And the advertisements were sent out requiring the contractor to bid for the ship without the armor, and it authorized armor manufacturers to bid for the armor? Those were the advertisements upon which proposals have been made and are now pending in the Department?

Mr. HICHBORN. Yes, sir; they are now pending.

Senator HALE. So that no contractor was ever called upon to bid for the entire ship with the armor? It never went so far as that?

Mr. HICHBORN. No, sir.

Senator HALE. That was stopped?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. The suggestions that were made by the Bureau of Construction for a new method of building did not prevail, and the old method prevailed?

Mr. HICHBORN. No, sir; the new method did not prevail.

Senator CHANDLER. And you understand that if the Secretary now awards a contract on existing proposals he will award a contract for the ships and for the armor separately?

Mr. HICHBORN. I take it he will.

Senator CHANDLER. How long have these proposals been before the Department? When did the time expire for making them? I refer to the proposals for the two ships, the *Kearsarge* and the *Kentucky*.

Mr. HICHBORN. The contracts are awarded for both of the ships, but no contract has been made yet for the armor.

Senator CHANDLER. The contracts for the two ships have been *awarded?*

Mr. HICHBORN. Oh, yes.

Senator CHANDLER. To whom?

Mr. HICHBORN. To the Newport News Company.

Senator CHANDLER. Both of them?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. The armor contracts have not been awarded?

Mr. HICHBORN. No, sir; they have not been put out yet.

Senator CHANDLER. The advertisements have been put out?

Mr. HICHBORN. No, sir.

Senator CHANDLER. I understood the Secretary to state that he had put them out.

Mr. STONE. No, sir; they have never been issued.

Senator CHANDLER. You say that the Secretary of the Navy has not yet advertised for proposals for armor for the *Kearsarge* and the *Kentucky*?

Mr. HICHBORN. Yes, sir; that is what I say.

Senator CHANDLER. Then I was mistaken. I understood that after certain conferences with the representatives of Carnegie, Phipps & Co. and the Bethlehem Company he had issued the proposals.

Mr. HICHBORN. Those were proposals for building the ships. He had to make a decision in that case in order to give the contractor full information as to how he was to bid. He had to make that decision ahead.

Senator CHANDLER. I understand that, but I also understood that he called for proposals for armor.

Mr. HICHBORN. He is at work at that now.

Senator HALE. Let me see if I understand the fact in reference to the building of these two ships. All the progress that has been made is that the proposals have been issued, the bids have been made for the building of the ships by the contractors, the contract awarded, after it was decided by the Department that the contracts should be separate, that the contractor should furnish the ship and the Government the armor, and up to the present time there have been no proposals issued with reference to the furnishing of the armor on the ships?

Mr. HICHBORN. You are correct, sir.

Senator HALE. When was the contract made for the building of the hulls of the ships with the Newport News Company?

Mr. HICHBORN. In January last, I think. If you are particular about the date, I guess I can tell you very quickly. [Examining memorandum.] It was January 2, 1896.

Senator HALE. What was the date of your letter to the Department suggesting the making of one contract for the entire ship, including the armor?

Mr. HICHBORN. September 6, 1895.

Senator CHANDLER. You will furnish a copy of that letter to the reporter.

Mr. HICHBORN. I think it would interest the committee if the letter was read.

Senator CHANDLER. I will have it read after we get all the documents in.

Mr. HICHBORN. Perhaps it might save some questions—that is all.

Senator CHANDLER. Very well; then I will not put the rest of the questions until we get the rest of the documents. Have you a copy of any written argument on the subject, either by the Bureau of Ordnance or the armor manufacturers, or of any decision by the Secretary?

Mr. HICHBORN. I have no knowledge as to what anyone else said, but only as to what I said myself.

Senator CHANDLER. Did the Chief of the Bureau of Ordnance, Commodore Sampson, argue the question in his report in favor of having the contracts separately?

Mr. HICHBORN. Oh, yes; quite extensively.

Senator CHANDLER. Will you refer to the report where Commodore Sampson made what may be considered an argument against your views as expressed in your letter of September 6, 1895?

Mr. HICHBORN. It commences on page 12 of the report of the Chief of the Bureau of Ordnance.

Senator CHANDLER. Will you point out to the reporter all the extracts from that report which bear upon this question?

Mr. HICHBORN. Pages 12, 13, 14, 15, 16, and 17:

"ARMOR CONTRACTS.

"Since the date of the last report 5,171.89 tons of armor have been delivered, of which 4,861.73 tons were Harveyized. The Harveyized armor includes the remainder of the 18-inch side armor of the *Indiana;* all that of the *Oregon* and *Massachusetts*, except the shutter plates of the latter vessel; the 14-inch side armor, except shutter plates, and 12-inch diagonal armor of the *Iowa;* the 12-inch side of the *Texas;* the 13-inch B. L. R. turrets of the *Indiana;* the 12-inch B. L. R. turrets of the *Puritan;* the 10-inch B. L. R. turrets of the *Monadnock* and *Maine;* two of the 8-inch B. L. R. turrets of the *Indiana*, and all of those of the *Massachusetts*, *Oregon*, and *Brooklyn;* the 13-inch B. L. R. barbettes of the *Oregon;* the 8-inch B. L. R. barbettes of the *Brooklyn* and *Iowa.* The unharveyized armor includes the conning towers and tubes of the *Katahdin*, *Texas*, *Massachusetts*, and *Indiana*, and a part of the *Puritan's* side armor.

"The contracts of June 1, 1887, with the Bethlehem Iron Company, and of November 20, 1890, with the Carnegie Steel Company, have been completed, while the armor which remains to be delivered on the contracts of February 28, 1893, and March 1, 1893, consisting as it does of the classes most difficult and tedious to manufacture, will assuredly be delivered in the case of the Carnegie contract before February 1, 1896, and in the case of the Bethlehem contract early the following July. This delivery is dependent, however, in certain cases, upon the promptness with which the necessary detail plans of this armor are supplied by the constructors of the hull of the *Iowa.*

"The past year's output of armor by no means represents the capacity of the plants, for important departments in both establishments have been practically shut down for considerable periods while awaiting the plans. In addition, the Bethlehem Iron Company has an armor-rolling mill nearing completion which will greatly increase the forging capacity of that establishment. As it has been decided to reduce somewhat the thickness of the heaviest armor carried by the new battle ships, while experience has indicated how its manufacture may be simplified, it is believed that the entire amount required for battle ships 5 and 6, estimated at 7,800 tons, can easily be supplied in less than one year after the receipt of the plans. Doubtless economy in manufacture will require a somewhat longer time, unless armor orders are received in sufficient amount to keep the shops working full. In fact, at the present time, in *spite of delays in* the receipt of the armor plans, all of the structural

armor for the *Iowa* will be delivered months before that vessel is launched.

"While, however, the number and capacity of the works capable of building the hulls and engines of vessels of war in this country is now quite large, and can be rapidly extended to meet increased demands, this is not the case with regard to the armor plants. Skilled labor of the character employed by the latter is limited to that actually engaged on Government contracts, which is not the case with regard to the building of hulls and engines. Once the armor maker's labor is scattered, new men must be trained at great expense and delay. It is apparent, therefore, that while in case of a sudden and large increase in the demand for war ships the hull and engine builders would be able to respond, the simultaneous demands for armor of the same character and position on the ships as the building of the hulls progressed would assuredly cause great delays. It is therefore regarded as most important, so long as the programme for the increase of the Navy remains uncompleted, that the authorization of additional armored ships be regular and continuous, and in this respect it is believed that the extensive armor experimentation carried on in this country has clearly indicated the direction in which development and improvement in resistance is to be expected, so that nothing in this respect will be gained by delaying the authorization of additional ships, especially as it will require nearly a year to formulate and place new armor contracts.

"The proposition to contract with the shipbuilder for the armor as well as for hull and machinery of ships does not meet with the Bureau's approval. While not intending to advocate anything that savors of paternalism, the Bureau feels that the Government has an interest in the two armor plants. In the report of the Secretary of the Navy for 1887 the statement is made that 'the contracts for armor and gun steel are made at prices within 25 per cent of the European price for the similar article, not greater than the difference in labor between the two countries, notwithstanding the heavy outlay for plant (estimated at $2,500,000) necessary to be made to undertake the contract.'

"It is evident, therefore, that for the purpose of establishing these great industries and widening the field in this country for skilled labor, more money has been paid for the armor of our battle ships than would have been necessary had the alternative of securing it abroad been considered. The view that should be taken is still wider than here represented, quoting again from the report of the Secretary of the Navy for 1887: 'My attention was early called to the fact that our shipbuilders were shut out from building for any foreign Government by reason of the fact that neither armor nor gun steel nor secondary batteries could be supplied in this country.' The maintenance of the armor plants is therefore a necessary condition of the employment of American labor and material on contracts for foreign men-of-war.

"While not desiring to insinuate that the shipbuilders would fail to hold the interests both of labor and material which have been gathered around the great armor plants as kindly as the Government, the Bureau is impressed with the idea that the transfer of over $3,500,000 of Government money, with all the power it conveys over these institutions, to the hands of a private corporation can not but be regarded with alarm.

"It is moreover believed that the Department will have no difficulty in forcing the price of armor down to a point allowing no more than a reasonable profit to the maker without jeopardizing the maintenance of both establishments.

"The following table summarizes the present condition of the contracts for the armor of the different ships at Bethlehem and Carnegie:

Armor still to be delivered October 1, 1895.

Vessel.	Description.	Amount to be delivered.				Remarks.
		Carnegie.		Bethlehem.		
		Number of plates.	Weight.	Number of plates.	Weight.	
			Tons.		*Tons.*	
Puritan	Conning tower			1	22.72	Ready Dec. 1, 1895.
Iowa	8-inch turrets	12	154.13			Plans received July 16, 1895.
	8-inch turret tops		10.50			Awaiting final plans; preliminary plans received July 16, 1895.
	12-inch barbettes	14	430.55			Awaiting final plans. Preliminary plans: Forward barbette received July 5, 1895; after barbette Aug. 13, 1895.
	12-inch turrets			10	448.51	Awaiting final plans; preliminary forging plans received July 26, 1895.
	Ammunition tubes			4	50	Ready Nov. 1, 1895.
	Conning tower			1	28.70	Do.
	4-inch casemate	4	16			Plans received Aug. 12, 1895.
	Side armor	2	54			Shutter plates awaiting final dimensions.
Oregon	13-inch turrets			12	287.36	6 ready October, 1895; 6 ready December, 1895.
Massachusetts	do			12	287.36	6 ready Jan. 1, 1896; 6 ready March, 1896.
	Side armor			2	72	Shutter plates awaiting final dimensions.
Brooklyn	Conning tower			1	20	Ready Nov. 1, 1895.
	Ammunition tubes			4	50	Ready Dec. 31, 1895.
Total			665.18		1,266.65	

Summary of armor deliveries to October 1, 1895.

	Carnegie Steel Company.	Bethlehem Iron Company.	Total.
	Tons.	*Tons.*	*Tons.*
Armor delivered to Oct. 1, 1894	5,315.32	6,533.28	11,848.60
Armor delivered since Oct. 1, 1894	2,885.45	2,286.44	5,171.89
Armor still to be delivered	665.18	1,266.65	1,931.83
Total	8,865.95	10,086.37	18,952.32

"ARMOR DELAYS.

"Serious delays in the completion of the ships have been ascribed to the slow delivery of armor in the past. When it is understood that the effort has been made to satisfy the almost simultaneous demands for the armor of fifteen ships whose authorization by Congress covered a period of ten years, and that this has been practically accomplished in a little over four years, even while the plants were being erected and labor trained, the enterprise and vigor of the manufacturers is worthy of praise rather than censure.

"Their difficulties have been exceptional. The material employed is one with which no previous experience had been elsewhere obtained; *and despite the fact* that the dimensions and weight of the heaviest

plates exceed considerably those manufactured for any other navy in the world a process surrounded by difficulties pronounced insurmountable by many of the most prominent engineers in this and other countries has been successfully developed and applied. It may now be stated with conviction that the time of the delivery of the armor for any probable number of ships authorized at one time in the future will rest in the hands of the contractors for the hull and be dependent solely upon the promptness with which they supply the necessary details for the fit and securing of the individual plates. Even now the armor makers, with reason, complain of losses they have suffered through enforced idleness while awaiting the detailed drawings of about 1,350 tons of armor for the *Iowa* and *Brooklyn*. These drawings were issued in 1893 and 1894, but owing to a contemplated change in the design of the turrets and barbettes were withdrawn and the work stopped for over one year. Nevertheless, all the armor of the *Iowa* has been delivered, with the exception of that thus delayed and about 45 tons of the diagonal armor finished some months ago but awaiting the correction of errors in the original plans.

"It is but fair to state that although the altered designs referred to call for plates of greater dimensions and difficulty of manufacture than those described in the original contract, while the aggregate weight and corresponding compensation is less, the manufacturers have accepted the modifications without demur other than that the size and weight of individual plates should not exceed the capabilities of their plants.

"The manufacture of modern armor is necessarily a slow process, and if the Government is to have its interests safeguarded, the detail plans should be furnished in time to permit its careful manufacture, thorough inspection, and replacement if rejected, without delaying the construction of the ship itself. For this reason changes in design affecting the armor are to be deprecated, and their necessity should be plainly apparent before the proposition is allowed serious consideration. The allowance of sufficient time for the manufacture is one of the most essential conditions toward insuring that the Government will get just as good armor as it pays for; otherwise pressure will inevitably be brought to bear upon the Department by the shipbuilders, who will complain of enforced delays and the resulting penalties through delay in supplying armor.

"On the other hand, the Government has immediate need of the ships. The tendency would therefore be when pressed for time to allow the incorporation of armor which, however conscientiously made, could not be proved to be fully up to the required standard without exhaustive tests and carefully considered experimentation. In such cases the duty of this Bureau has required great firmness and the exercise of most careful judgment, in order to avoid working hardship both upon the manufacturers, by rejecting suitable material for purely technical reasons, and upon shipbuilders, by causing them delay through holding back armor of doubtful quality. It is therefore recommended that in future contracts for the hull the shipbuilders be required to supply final detail plans of the armor in sufficient quantity and time to permit its proper and economical manufacture before being required on the ship.

"The high temperature required in the application of the Harvey process has in itself caused considerable loss to all of the manufacturers as well as most vexatious delays in delivery of armor. Portions of the 13-inch B. L. R. turret plates for the *Oregon* and *Massachusetts* and several side armor plates for the latter ship were oxidized over considerable areas through the admission of air while in the Harvey fur-

nace, this defect not being discovered until the plates were practically completed and the attempt made to harden them. This has been the cause of several months' delay. Certain plates for one turret have had the defects removed, the plates being shortened and the length thus lost being made up by adding an extra plate to the turret. This proceeding, although reducing the inertia with which individual plates resisted impact, was unanimously approved of by the Board of Construction as in the Government's interests, through avoiding the great delay which would have resulted from the manufacture of new plates. In the case of two other large plates, the defects were such as necessitated their rejection.

"FITTING FRAMES TO ARMOR.

"The irregular distortion of face-hardened armor can not invariably be foreseen and provided against. However, by increased care and skill in manufacture it has been brought to a minimum; in fact, the builders of the *Oregon* have expressed gratification at the neatness of fit and ease with which the side armor of that ship was fitted into place, while that of the *Indiana* now presents as good a surface as oil-tempered armor.

"It is in the interest of the contractors for the hulls, to insist that the armor should conform in shape to a certain limited tolerance in order to permit the various structures and frames to be constructed before the armor is made.

"The armor most difficult to shape, since the curvature is large and in the latest designs variable, is that for the turrets, the structures of which are built apart from the ship and need in nowise affect its completion. The Bureau has represented to the Department the impossibility of fixing a narrow tolerance for the shape of such armor, since a good plate but slightly exceeding such a tolerance might have its resistance impaired by softening or straining it in the attempt at rectification. It has been deemed advisable, therefore, to consider each individual plate on its own deviations and requirements, firmly believing that in the interests of expedition and improved resistance all turret structures should be built to conform to the shape of the completed armor, the butts of the latter being of course faced and well fitted. This may be claimed to inflict hardship upon the contractors for the hull, since the turret structures might otherwise be completed in their yards and partial payments made upon them long before the ship is sufficiently advanced to receive them.

"The building of these structures, however, is not at the time necessary to advance the work on the ship, and in fact the ship is completed no earlier in consequence, for when the structure is not made to conform to the shape of the armor the irregularities in the latter necessitate a similar variation in the length of the bolts which secure it, a special bolt being necessary for each location. The lengths of these bolts can not be determined before the armor is fitted into its position on the ship, and there then ensues a vexatious delay of some weeks, during which time special drawings and schedules are prepared from which the required bolts can be made. This is all the more annoying as it occurs at the time when the ship is practically completed and affords the shipbuilder an opportunity to account for delays by the nonreceipt of armor bolts. As the experimental 13-inch B. L. R. turret structure of the *Massachusetts* was contracted to be completed in one *month, at a time* when it was difficult to place small orders for the

necessary material, and as the fit and shape of the armor affects only a portion of the turret structure, it is believed that just as much time is lost in obtaining the special bolts required as is gained by the completion of the turret structure before the arrival of the armor. The great advantage of having all armor bolts in the turret of a uniform type and dimension and delivered with the armor is obvious. The ease and rapidity with which bolts damaged in action could then be replaced is also a very important reason.

"As the armor plate, however, costs the Government many times as much as the structure to which it is secured, and the resistance of this most important of all protection depends upon the soundness of the individual plates and the solidarity of the armor butts rather than the relatively flimsy frames to which it is secured, it is strongly recommended that in future contracts it be expressly stipulated that the frames of turrets and barbettes be constructed to fit the armor after it shall have been received.

"In the case of side and diagonal armor, where the resistance of the entire structure of frames, beams, and protective deck supports the flat plate rather than its abutment upon the adjacent plates, as in circular structures, a considerable variation in shape from that required may be taken up by fitting the wooden backing to conform to the plates. It has been proposed, much on the same plan, to fit a very thin wooden backing to all turrets in order to permit a bearing to be easily obtained over the entire inner surface of the armor plates.

"This wood of itself has no measurable resistance, while its weight, as well as that due to the increased circumference of enveloping armor, is wholly objectionable, and can be avoided by making the frames fit the armor, thus reducing the cost, weight, and size of these most expensive structures. For example, by increasing the diameter of the original design of the *Iowa's* 12-inch B. L. R. turrets 5 inches in this manner, the actual weight of armor added would be about 3 tons, without counting the additional row of armor bolts and numerous rivets thus made necessary. The weight of the teak backing itself, without counting the backing bolts, would be 3.5 tons, so that, including the increased size of frames, the actual weight thus added to the structure would be about 7 tons, and the cost to the Government of the additional armor and bolts required fully $3,000. The actual cost of the frames fitted to the armor in the most aggravated cases of distortion should not greatly exceed this."

Senator CHANDLER. Can you give us any other record evidence on the question?

Mr. HICHBORN. No, sir; that is all I know. Any other discussion went on without my knowledge.

Senator CHANDLER. Is there any written decision of the Secretary on the subject?

Mr. HICHBORN. No, sir; not to my knowledge.

Senator CHANDLER. All the decision, then, was in regard to the change that took place in the proposals?

Mr. HICHBORN. That is all.

Senator CHANDLER. Have you any copies of the proposals as they were first drawn and as they were finally issued?

Mr. HICHBORN. No, sir; I have them only as they were finally issued. I knew of the first from a conversation with the judge advocate, who got up the proposal.

Senator CHANDLER. Have you copies of the proposals that were *finally issued?*

Mr. HICHBORN. No, sir; but I can furnish them to you if you wish.
Senator CHANDLER. Please insert them in the record.

The proposals referred to are as follows:

PROPOSALS FOR THE CONSTRUCTION OF TWO BATTLE SHIPS FOR THE UNITED STATES NAVY.

NAVY DEPARTMENT,
Washington, D. C., September 14, 1895.

Under authority conferred by the act of Congress making appropriations for the naval service, approved March 2, 1895, sealed proposals are hereby invited and will be received at this Department until 12 o'clock noon on Saturday, the 30th day of November, 1895, at which time and place they will be opened in the presence of attending bidders, for the construction, by contract, for the United States Navy, of two vessels, exclusive of armament, which vessels are, for the purposes of this advertisement, designated as

BATTLE SHIPS NOS. 5 AND 6.

Two seagoing coast-line battle ships of about 10,000 tons displacement each.

As required by the aforesaid act of March 2, 1895, in the construction of said vessels, "All of the provisions of the act of August third, eighteen hundred and eighty-six, entitled 'An act to increase the naval establishment,' as to materials for said vessels, their engines, boilers, and machinery, the contracts under which they are built, except as to premiums, which are not to be offered, the notice of any proposals for the same, the plans, drawings, and specifications therefor, and the method of executing said contracts, shall be observed and followed, and said vessels shall be built in compliance with the terms of said act, save that in all their parts said vessels shall be of domestic manufacture."

All armor, armor bolts, and their accessories, required for use in the construction of said vessels, excepting such as may be required for the protective decks, are to be furnished by the Government, but the contractor is to furnish all rivets and other fastenings, and drill, tap, and fit all holes for rivets and other fastenings used to connect any part of the hull framing to the armor for constructive purposes, and fit, fix, place, and secure to the vessels, in accordance with the plans and specifications, all of the armor, including that used in the construction of the turrets, barbettes, conning towers, and ammunition tubes, and protection for the guns and loading positions.

The contracts for the construction of said battle ships will contain provisions to the effect that the contractor guarantees that when completed and tested for speed, in the open sea, under conditions to be prescribed by the Navy Department, the speed developed by the vessel upon such trial shall be not less than an average of 16 knots an hour, maintained successfully for four consecutive hours, during which period the air pressure in the fire room shall not exceed an average of one inch of water. If on trial the vessels develop and maintain as aforesaid an average speed of 16 knots an hour or more, they will be accepted, so far as speed is concerned. If the vessels fail to develop and maintain as aforesaid said guaranteed speed (16 knots), but exhibit an average *speed of not less* than 15 knots an hour, they will be accepted, so far as

speed is concerned, at a reduced price, the reduction being at the rate of one hundred thousand dollars a knot. If the speed falls below an average of 15 knots an hour, it shall be optional with the Secretary of the Navy to reject the vessels or to accept them at a reduced price, to be agreed upon between the Secretary and the contractors. The contracts will provide that all the expenses of all trials prior to preliminary or conditional acceptance shall be borne by the contractor.

Said vessels are to be constructed in accordance with plans and specifications provided or adopted by the Secretary of the Navy. A circular defining the chief characteristics of said vessels and their machinery, and enumerating the requirments with which the plans and specifications therefor provided by bidders should comply has been prepared, and copies of the same may be obtained upon application to the Bureaus of Construction and Repair and Steam Engineering. Plans and specifications for the construction of said vessels may be seen and examined at the Department on and after October 30, 1895, and forms of proposals embracing a general statement of provisions to be included in the contract for each vessel will be prepared, and may be obtained at any time after said date, on application to the Department, where all information essential to bidders can also be obtained.

Said vessels must be completed within three years from the dates of the respective contracts, and payments on each vessel will be made in thirty equal installments as the work progresses, upon bills duly certified, from which ten per cent will be reserved to be paid on the full and final completion of the respective contracts.

The aforesaid act of March 2, 1895, further provides that one of said vessels shall be built on or near the coast of the Pacific Ocean, or in the waters connecting therewith, and that if it shall appear to the satisfaction of the President of the United States, from the biddings for the contract, that said vessel can not be constructed at a fair cost on or near the coast of the Pacific Ocean, he may authorize the construction of said vessel elsewhere in the United States. It is therefore required that each bidder shall state explicitly in his proposal the place where the vessel upon which he bids is to be constructed. In view of the fact that the Department may find it necessary to award the contracts for both vessels to one builder, it is desired that each bidder will state the price for which he will undertake to build both.

Proposals for the construction of said vessels will be received "from every American shipbuilder and other person who shall show, to the satisfaction of the Secretary of the Navy, that within three months from the date of the contract he will be possessed of the necessary plant for the performance of the work in the United States which he shall offer to undertake." The evidence thus required must accompany the proposals or be submitted to the Department in advance.

Each proposal must include the construction of both the vessel and her machinery, complete in all respects, as required by the plans and specifications, and contract will be made separately for each vessel, including hull and machinery.

Proposals are divided in two classes, as follows:

PROPOSALS FOR HULL AND MACHINERY—CLASS 1.

For the construction of hull and machinery, including engines, boilers, and appurtenances, equipment, except anchors and chains, and the installation of ordnance and ordnance outfit, complete in all respects, in accordance with plans and specifications provided by the Secretary of the Navy.

PROPOSALS FOR HULL AND MACHINERY—CLASS 2.

For the construction of hull and machinery, including engines, boilers, and appurtenances, equipment, except anchors and chains, and the installation of ordnance and ordnance outfit, complete in all respects, in accordance with plans and specifications provided by the bidder. But no such proposal will be considered unless accompanied by full and complete specifications of the hull and machinery, by such plans as may be necessary for a thorough interpretation of the design thereof, and by a satisfactory guarantee of the results of the same if adopted.

Bidders may, if they so desire, adopt the plans and specifications of the Department for the hull or machinery, or any part thereof, and embody them in their plans and specifications to be submitted with their proposals.

Bidders who may desire to offer to construct both of said vessels may, embrace both in one proposal, the price of each being given separately, and may propose separately for one or both under one or both of the two classes of proposals as above specified.

Each proposal must be accompanied by a satisfactory certified check, payable to the order of the Secretary of the Navy, and the check of each successful bidder shall become the property of the United States in case he shall fail to enter into the requisite contract and to furnish the requisite security on the acceptance of his proposal. The amount of such check must be at least $80,000, with a proposal for one vessel, or $100,000, with a proposal for both vessels. All checks of bidders whose proposals shall not be accepted will, on the award of the contracts, be returned to them; the check of each successful bidder will be returned to him when his contract has been duly entered into and the requisite security furnished. Every successful bidder will be required, within twenty days after the acceptance of his proposal, to enter into a formal contract for the faithful performance of the work and to give a satisfactory bond for such performance in a penal sum equal to fifteen per cent of the amount of his bid.

Proposals must be made, in duplicate, in accordance with forms which will be furnished on application to the Department, enclosed in sealed envelopes, addressed to the Secretary of the Navy, Navy Department, Washington, D. C., and marked "Proposals for the construction of battle ships." The Secretary of the Navy reserves the right to reject any or all bids, as, in his judgment, the interests of the Government may require.

H. A. HERBERT,
Secretary of the Navy.

Senator CHANDLER. Will you now read your letter of September 6, 1895?

Mr. HICHBORN. It is as follows:

WASHINGTON, D. C., *September 6, 1895.*

SIR: 1. In all armored ships heretofore constructed under contract the Government has furnished all armor, armor bolts, and accessories. The reasons which existed for this course at the beginning have now ceased to exist, and it carries with it so many disadvantages that the Bureau is of the opinion that the practice should be discontinued, and that all armor, armor bolts, and accessories should hereafter be furnished by the contractors for the vessel.

2. The specifications relative to armor in case of battle ships Nos. 1, 2, and 3, read as follows:

"Except the protective deck, the Government shall furnish all other armor, armor bolts and their accessories to be used in the construction of the vessel, including such as may be required in the construction of the armor belt, casemate, turrets, barbettes, gun shields, ammunition tubes, and in the protection for the guns and loading positions; to trim such armor plates to the drawings or template sizes and shapes within reasonable manufacturing limits, as set forth in the specifications that may be approved for them, and drill and tap all necessary holes therein, as shown by said approved drawings and templates, and to deliver said armor, armor bolts and their accessories at such reasonable place or places in the contractors' shipyard as may be designated by the contractors, and within the time and in the order required to carry on the work properly."

3. Under this specification the armor, with its bolts and accessories, has been manufactured by certain armor contractors under contract with the Navy Department and under the immediate inspection of the Bureau of Ordnance. That Bureau has stationed inspectors at the works of the armor contractors, whose duty it has been to see that the manufacture of the armor was conducted properly and that the quality of the completed material complied in all respects with the specifications, as well as that its shape and dimensions were correct according to the approved plans and schedules. After the completion of each group of armor the Ordnance Bureau subjected a representative portion of the same to certain ballistic tests before final acceptance. The method just outlined of insuring the faithful performance of their contract by the armor contractors is a good one, and this Bureau has no desire to suggest a change therein, but considers that the same method of inspection by the Bureau of Ordnance should be followed out in future ships.

4. The difficulties that have been encountered with the ship contractors relative to armor are entirely independent of the above system of inspection, and are due wholly to the method of contracting for the armor. Instead of the armor being included in the general contract for the ship, whereby the Department could hold the ship contractors directly responsible for all delay, as well as for any increased expense of fitting due to errors in plans or in manufactured armor, the Department is under contract to furnish the armor to the ship contractor, properly fitted, drilled and tapped, and to carry out this agreement the Department makes a separate contract with the armor contractors for the armor.

5. The practical result has been that the Department has acted as a buffer between the ship contractors and the armor contractors. Much annoyance has been caused and considerable extra expense incurred by delay in furnishing armor. Not only has it been necessary to allow the ship contractors long extensions of time, but they have actually been paid for taking care of vessels during such time. Endless correspondence has been caused, the ship contractors on the one hand continually writing for armor, and urging that it be delivered more promptly, and the Department on the other hand endeavoring to comply with their not unwarranted demands. While much of the difficulty due to this source would probably be avoided in future ships, owing to the more rapid delivery of armor which may reasonably be expected hereafter, yet there are many other reasons which make the change above suggested desirable.

6. Even supposing that there is absolutely no delay in the manufacture and delivery of armor, there are many other sources of complex correspondence and of increased expense. Under the present system the plans and schedules for each plate are prepared by the ship contractors, and are by them submitted to the superintending naval constructor. After careful examination the latter forwards the plans to this Bureau, when they are again examined. This Bureau then forwards the plans, etc., to the Bureau of Ordnance. After approval by the Bureau of Ordnance, that Bureau sends the plans to the armor contractors and notifies this Bureau of its action. This Bureau then similarly informs the superintending naval constructor, and he in turn informs the ship contractors. This is all on the assumption that the plans are found to be correct and acceptable to the armor contractors. With the slightest discrepancy in any of the figures, or any difference of opinion relative to any point, an enormous mass of correspondence at once ensues, as every letter and plan must make the lengthy circuit above outlined. With a place as far distant as San Francisco, it has been no unusual thing to have months elapse between the preparation of a plan and its final acceptance. And what is the cause of all this complicated correspondence? Simply the fact that the Government is responsible for the shape and dimensions of all armor, and that any final discrepancy (which with harveyed armor it is almost impossible to wholly avoid) at once brings from the ship contractors demands for extra compensation for correcting such discrepancy. What has been said above relative to armor is even more true of the armor bolts and accessories, whose minutiæ lead to an amount of correspondence and delay that would seem incredible were it not so real. In addition to all the above, there are unceasing demands from the armor contractors for plans and schedules, all of which are made on the Department, the latter having the thankless task of hurrying up the delinquent ship contractors, while under the new system proposed all such friction would be confined between the armor contractors and ship contractors, where it properly belongs.

7. All this would be obviated by making the furnishings of all armor a part of the contract for the vessel. Instead of the ship contractors holding the Department responsible for prompt delivery as well as for correct shape and dimensions, the respective positions of the parties would be reversed. Nine-tenths of the correspondence would cease; the ship contractor would deal direct with the armor contractor, holding him directly responsible for accurate work, and being himself directly responsible to the latter for early and correct plans. The Department would be saved much annoyance and expense, and could hold the ship contractor to a prompt fulfillment of his contract without being continually met by counterclaims relative to delay in furnishing armor.

8. For the above reasons, the Bureau recommends that all armor, armor bolts, and accessories be hereafter included in contracts for naval vessels, but that the present method of inspection and acceptance by the Bureau of Ordnance be continued. That Bureau would thus occupy the same position relative to armor as the steel inspection board does to other ship material. For the latter, the ship contractors make their own contracts with the steel manufacturers, but all material must be inspected and accepted by the steel inspection board. This arrangement has worked well in practice, and the time has now come when, in the opinion of this Bureau, a similar method should be applied to *armor.*

It is believed that an immediate result of the method recommended would be a material reduction for the future in the price of armor, resulting in a saving in total cost of our ships.

9. The Bureau of Ordnance has been furnished with a copy of this communication.

Very respectfully, PHILIP HICHBORN,
Chief Constructor, U. S. N., Chief of Bureau.

The SECRETARY OF THE NAVY.

Senator CHANDLER. Referring to your letter of September 6, 1895, and also to the $80,000 now claimed by the Richmond Locomotive Works, which built the machinery of the *Texas*, did the question of armor have anything to do with that delay?

Mr. HICHBORN. Yes, sir; I think it did.

Senator CHANDLER. Was not the contract of the Richmond Locomotive Works only for machinery?

Mr. HICHBORN. It was only for machinery, but they could not have a trial of their machinery until the ship was completed.

Senator CHANDLER. Did the delay in furnishing armor have anything to do with the amount of $80,000 that we are called upon to pay?

Mr. HICHBORN. The records of the Department will, I think, show that in full.

Senator CHANDLER. That the delay in furnishing the armor had something to do with it?

Mr. HICHBORN. Yes, sir.

Senator HALE. The delay in furnishing armor under the armor contracts troubled the Department greatly for years and led to delays in the general construction and finishing of the ships. Has that feature comparatively disappeared lately? Has it been within the last two years as bad as it was before? How is that?

Mr. HICHBORN. The delivery of armor has been made more rapidly, but we have no illustration of delay in delivery having disappeared. We have the case of the *Massachusetts* and the *Oregon* on our hands to-day.

Senator HALE. And they are delayed?

Mr. HICHBORN. Well, all the armor has been delivered for those two ships now, but it has kept them back up to the present time. It is only within a short time that the full amount has been delivered.

Senator HALE. Has that cause delayed the completion of the ships beyond what would have been the time of finishing them if the armor plate had not been delayed? In other words, could the Department have finished the ships and gotten them ready sooner if the armor on those two ships had been furnished?

Mr. HICHBORN. There is no question but that they would have been finished if only we could have gotten the armor, but the armor has not been altogether the cause of delay. It has been the armament equally with the armor.

Senator HALE. Both?

Mr. HICHBORN. Yes, sir; both have caused delay. The *Massachusetts* has not got all her guns; she has all her armor. Of course the contractor can not finish his ship until he can get the guns in place. For instance, the heavy 13-inch gun is not in the turret. When he gets the gun, which he has not gotten yet, he will put it in the turret, and after he puts it in the turret and gets things all right he tries the turret and sees that everything works satisfactorily, and then he puts on the

top of the turret. After the delivery of the gun there is considerable work, for three weeks is required for the contractor to close up.

Senator CHANDLER. Many of these delays and troubles would occur under the new system?

Mr. HICHBORN. Yes, sir; some of them would.

Senator CHANDLER. All the difficulties in adjusting the armor to the ship and putting it on her are not caused by having two contracts?

Mr. HICHBORN. No, sir; difficulties of mechanical construction are bound to occur under any system.

Senator HALE. Do you think that the contractor would be able to drive up the armor plate manufacturers to more speedy work in delivery than the Government?

Mr. HICHBORN. Yes, sir. He could make a contract with the armor people in which there would be heavy penalties, by which he would protect himself.

Senator HALE. You think the result would be that the contractor would exercise more power and influence in expediting the work of the armor manufacturers than the Government can now exercise?

Mr. HICHBORN. I think so, because there would be only two people to deal with the subject; they could come right together; when there is any little adjustment to be made they would fix it right up between themselves. All the Government wants is results. The Government does not care so much about the small details, as to which no one takes the responsibility.

Senator TILLMAN. You mentioned a moment ago something about a steel inspection board. What is that board?

Mr. HICHBORN. It is a board of officers appointed by the Navy Department who inspect all the material that enters into the construction of a ship, and pass upon its qualifications—the steel material, the beams, angles, plating, rivets, castings, and such like.

Senator TILLMAN. Is that under your control?

Mr. HICHBORN. No, sir; it is under the Secretary of the Navy.

Senator TILLMAN. It is an independent branch of the Department?

Mr. HICHBORN. It is an independent branch entirely, under the orders of the Secretary of the Navy.

Senator TILLMAN. Then you have the Ordnance Board, whose duties are confined to the construction and inspection of arms, I understand. Will you state what are their duties?

Mr. HICHBORN. The Ordnance Bureau is engaged in the manufacture of guns and mounts. The duty of testing armor and the reception of armor also comes under that Bureau.

Senator TILLMAN. It has nothing to do with the construction of vessels except in that particular?

Mr. HICHBORN. Nothing excepting the guns, mounts, and armor.

Senator TILLMAN. Your Bureau furnishes the plans for the vessels?

Mr. HICHBORN. Yes, sir.

Senator TILLMAN. Do you have anything else to do with them?

Mr. HICHBORN. We have the superintendence of the building of the ship and the charge of the ship as a whole when she is finished.

Senator TILLMAN. Is this steel inspection board part of the machinery through which you work?

Mr. HICHBORN. It is a part of the machinery through which we work.

Senator TILLMAN. You have to depend on it, however, and yet it is not responsible to you?

Mr. HICHBORN. Oh, no, sir; it is not responsible to me.

Senator TILLMAN. This system appears somewhat roundabout, accord-

ing to your own judgment, from the letter which you have just read. It is a kind of circumlocution, a scheme how not to do it. Who is responsible for that? Is it the Secretary of the Navy or Congress? Is it according to law or according to regulation?

Mr. HICHBORN. According to regulation.

Senator TILLMAN. It is then left with the Secretary of the Navy to change the system if he sees proper?

Mr. HICHBORN. Yes, sir.

Senator TILLMAN. Do I understand you to say that the different bureaus are not matters of law, but of regulation?

Mr. HICHBORN. The bureaus are matters of law, but I was speaking of the inspection board, which was all very well when it first started.

Senator TILLMAN. You said a while ago, I believe, that you have been connected with the Bureau of Construction, I mean at the top of it, about thirteen years; that you were assistant constructor for ten years, and that you have been chief constructor for three years?

Mr. HICHBORN. Yes, sir.

Senator TILLMAN. So you have been perfectly familiar with and in some measure responsible during that length of time for all the plans and the general construction of vessels?

Mr. HICHBORN. All except the *Texas*. I want that exception made.

Senator TILLMAN. In what way or why was that vessel put in somebody else's charge rather than yours?

Mr. HICHBORN. The Department advertised for plans in Europe for the building of an armored cruiser and battle ship, and those plans were prepared by an English firm and sent here to the Navy Department. The Navy Department appointed a board of officers and civilians, a mixed board, I think as many as nine people. One of the members of the board was Mr. Burgess, a celebrated yacht builder, who died some years ago. I do not suppose he ever had anything to do with a man-of-war in his life. They passed on the *Texas* plans and pronounced them all right, and recommended to Secretary Whitney that the plans be purchased. The Government purchased them and ordered the ship to be built according to the plans and specifications.

Senator CHANDLER. At what price were the plans purchased?

Mr. HICHBORN. I think it cost the Government about $20,000 for the plans.

Senator HALE. And ordered the ship built not by contract but in the navy-yard at Norfolk?

Mr. HICHBORN. Yes; at the Norfolk Navy-Yard.

Senator BACON. What is the explanation of the fact that the plans were asked for in Europe instead of here?

Mr. HICHBORN. The Secretary was no doubt told by many people that the American constructors had had only a little experience in the building of these new ironclads, and if they got plans from Europe they would probably get the advantage of foreign skill as well as American skill, and that it would be a sort of object lesson to the constructors of the American Navy.

Senator BACON. Prior to that time had there not been plans received by the Department from American designers?

Mr. HICHBORN. Oh, yes.

Senator BACON. Which had proved satisfactory?

Mr. HICHBORN. Yes, sir.

Senator BACON. Was there any such practical defect in those which had been previously constructed as would suggest the propriety of looking elsewhere for plans?

Mr. HICHBORN. To my mind none whatever. Of course it was a very touchy point with an American constructor to have anyone go abroad and gather plans to build American ships; although the *Texas* is not the only case. We had the *Baltimore* and the *Charleston* built from English plans purchased by the Government.

Senator BACON. Which of the armored ships had been previously built or in process of construction under American designs prior to that time?

Mr. HICHBORN. No armored ships. The *Maine* and the *Texas* were the first to start. The *Maine* was built at New York, and the *Texas* at Norfolk. After that followed the battle ships.

Senator BACON. Was the *Maine* by American design?

Mr. HICHBORN. Yes; it was designed by the Bureau of Construction.

Senator BACON. In the Department here?

Mr. HICHBORN. Yes, sir.

Senator HALE. You made all the designs for the *Maine* in the Department?

Mr. HICHBORN. Yes, sir; in the Department.

Senator CHANDLER. How much is she like the *Texas?*

Mr. HICHBORN. She is not like her in any particular.

Senator CHANDLER. Is she not of about the same size and the same general character of battle ship?

Mr. HICHBORN. Her battery is different, and she is different in many ways. About the only similarity she has is in the arrangement of her turrets. The turrets of the *Maine* are arranged in echelon form, one on each side, and the *Texas's* turrets are arranged in that way, which is an obsolete method at the present time, because they are now arranged on the center line.

Senator CHANDLER. So that although the *Maine* and the *Texas* were authorized at the same time and are sometimes spoken of as sister ships, there are more points in which they do not resemble than in which they do resemble each other?

Mr. HICHBORN. The one I have described is the only point in which they do resemble each other. The *Texas* has only one gun in her turret, while the *Maine* has two guns in her turret.

Senator TILLMAN. How is the armor or the steel contracted for by the Government paid for and delivered? Who watches?

Mr. HICHBORN. The armor is contracted for by the Government and then it furnishes officers to inspect it.

Senator TILLMAN. You just stated that the steel board is supposed to watch it. Who pays for it, and who is responsible in case the Government is swindled or cheated?

Mr. HICHBORN. The Bureau of Ordnance.

Senator TILLMAN. Not the steel inspection board?

Mr. HICHBORN. The steel inspection board has nothing to do with the armor. There are two distinct methods of inspection—two different boards.

Senator TILLMAN. That is what I have been trying to get at. It is just beginning to dawn upon me that the Board of Ordnance has the control of the protection of the vessel, or its iron-cladding, so to speak?

Mr. HICHBORN. The armor.

Senator TILLMAN. Whereas the steel inspection board has control of the material for construction of the hull and the skeleton. Is that the case?

Mr. HICHBORN. Yes, sir.

Senator TILLMAN. Then the steel inspection board is not respon-

sible in any degree for any defects in the outside plating and the protective part of the vessel?

Mr. HICHBORN. The steel inspection board is responsible for the quality of any material that enters into the construction of the hull.

Senator TILLMAN. Of the inside of the vessel?

Mr. HICHBORN. The inside and the outside.

Senator TILLMAN. The framework?

Mr. HICHBORN. Yes; the hull of the vessel, the structure.

Senator TILLMAN. And that only?

Mr. HICHBORN. Yes, sir; and that only.

Senator TILLMAN. I am just trying to get around to the practical working of the system.

Mr. HICHBORN. You are all right. I will try to make it as plain as I can to you.

Senator TILLMAN. You said a moment ago, as I understood you, that your Bureau has control of the entire structure. That is, you have general supervision not only of the hull, but of the completed vessel?

Mr. HICHBORN. Yes; I stated that. For instance, if, after the ship is completed, there is anything wrong in regard to the ship, if she is one-sided or if she is weak in her structure, if she is improperly constructed in any way or form, if there are any complaints about the vessel, that subject is referred to me for explanation. In other words, the Secretary places under me the design, the stability, and the structural strength of the vessel.

Senator TILLMAN. What about any defects in armor?

Mr. HICHBORN. I would not hold myself responsible for that at all. The question of armor is entirely outside of the Bureau of Construction.

Senator TILLMAN. Have all the vessels which we have, of what we call the modern navy, been built by contract, or have some of them been built in Government navy-yards?

Mr. HICHBORN. Four vessels altogether of the new Navy have been built in the navy-yards.

Senator TILLMAN. By the Government artisans?

Mr. HICHBORN. By the Government artisans. The *Maine* and the *Cincinnati* were built at the New York Navy-Yard; the *Texas* and the *Raleigh* were built at the Norfolk Navy-Yard.

Senator TILLMAN. In the protecting of the Government by the inspection of the armor for all four of those vessels, was it to the same degree inspected by the ordnance board as in the case of the vessels contracted for?

Mr. HICHBORN. By the same people.

Senator TILLMAN. Under the same system?

Mr. HICHBORN. Under the same system.

Senator TILLMAN. The same system of supervision and inspection obtained in regard to all of them?

Mr. HICHBORN. Yes, sir; the same system, but very often there has been a change of officers. They were not the same people doing the duty. The officers who do this duty are seagoing officers.

Senator TILLMAN. Would it ever come to your knowledge that this system of inspection has been defective in any particular? Have you any facts or do you know of anything in regard to the structure and the armor plating of these vessels which would indicate that there has been neglect on the part of some officers or a cheating of the Government by the contractors?

Mr. HICHBORN. No, sir; nothing of that kind would come to me.

Senator TILLMAN. Who would it come to?

Mr. HICHBORN. Occasionally complaints would come from the constructors that the armor did not follow the shape correctly.

Senator TILLMAN. If such a thing would happen, who would know?

Mr. HICHBORN. The Chief of Ordnance would know that, because he is entirely in charge of the work of supplying the armor.

Senator TILLMAN. You would not know it?

Mr. HICHBORN. No, sir; I would not know it?

Senator TILLMAN. Is there nothing which would make it come to you in some way, or be known to you that such things had happened?

Mr. HICHBORN. No, sir; I do not know of any way. I might read in the papers of some complaint made, but I would have nothing officially coming before me.

Senator CHANDLER. You knew of the investigation as to the Carnegie plates?

Mr. HICHBORN. I knew it the same as every citizen knows, and it interests me, of course.

Senator CHANDLER. None of the facts transpired in or through your Bureau?

Mr. HICHBORN. No, sir; and no question was asked me in regard to it, as far as that is concerned. Nothing of an official character of that kind as to the quality of armor ever comes before me.

Senator TILLMAN. Now, I am going to ask you a right frank, square question, and, of course, I judge by your character and general appearance that you will give me a frank answer. Has the Government ever been cheated by imperfect steel that was not harveyized—being put on—just simple, common steel put on sponsons or protective deck plates in any of these vessels?

Mr. HICHBORN. Not to my knowledge.

Senator TILLMAN. Have you ever inspected them?

Mr. HICHBORN. No, sir.

Senator TILLMAN. Would you know if you were to inspect them?

Mr. HICHBORN. I do not think I could tell after they were worked in place. From general observation I do not think a man could tell.

Senator TILLMAN. How would it be discovered?

Mr. HICHBORN. It would be discovered in the ballistic test that takes place at Indian Head.

Senator TILLMAN. You could not tell it otherwise?

Mr. HICHBORN. I do not think one could.

Senator TILLMAN. In other words, there is nothing in the way of drilling which would show whether the process of hardening and therefore the protective qualities of the armor were up to the standard in any other way than by simply putting a plate up and shooting at it?

Mr. HICHBORN. That would be the only way. That would test the quality of it. You might see a slight crack, or there might be some slight imperfection that the eye would discover, but that might not indicate that the armor was defective. I do not know anything about the defects of armor, except what I read in the papers as to complaints.

Senator TILLMAN. Have you read anything in the papers along that line other than what you have just mentioned in regard to Carnegie?

Mr. HICHBORN. At the time the investigation was going on by the House Naval Committee there was a great deal published, and a pamphlet was published that gave the result of their deliberations, in which they complained of defective armor being put on some of the vessels.

Senator TILLMAN. That would emphasize the necessity, it appears to me, of having men of the strictest integrity as well as of the greatest *industry as inspectors* at the armor manufactories, would it not?

Mr. HICHBORN. It would require that they should also have a necessary mechanical skill.

Senator TILLMAN. Do you believe that the line officers, or those who are supposed to be taught the duty of a naval officer to command a vessel, but not to build one, are the proper men to have charge of this important and, I might say, vital department?

Mr. HICHBORN. They are not the people whom I should pick out for that duty if I had the selection.

Senator TILLMAN. For instance, if we get into a war, and find when our vessels which have cost us so much get in battle that their armor which ought to protect them against ordnance of certain size will not do so, and that it has been shoddy, so to speak, it will be too late to then remedy the defect, and the Government will have paid an enormous sum for vessels supposedly first class, according to present naval architecture and construction, but the material, the vital part of the matter, is defective.

Mr. HICHBORN. That would be a very vital thing to happen; but I do not think there is danger of any such occurrence as that.

Senator CHANDLER. You stated, in answer to Senator Tillman, that you did not know yourself of any defective armor outside of the investigations that have been made and that have been published. Have you heard of any defective armor, or armor not sufficiently hardened, so that you could suggest to the committee where it could learn any additional facts on the subject?

Mr. HICHBORN. No, sir.

Senator CHANDLER. You have no knowledge, even by hearsay?

Mr. HICHBORN. No, sir.

Senator CHANDLER. As to defective armor having been used?

Mr. HICHBORN. No, sir.

Senator HALE. Have you any doubt, from your general knowledge and interest in the Department and your observation, that the armor upon these ships is remarkably good armor?

Mr. HICHBORN. None whatever; I believe it is remarkably good armor.

Senator HALE. Remarkably good?

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. You may state, if you please, what you once stated to me about the extreme hardness of the harveyized plates and the difficulty of attaching them by rivets and bolts to the hull of the ship.

Mr. HICHBORN. When the question of using harveyed armor first came up, it was a subject that naturally interested the Bureau of Construction, as it had to place the armor in position. The armor in many places has to have holes drilled in it—the harveyed armor, for instance. One of the first intimations we had that the harveyed armor was being introduced was a notice from the Bureau of Ordnance that under no circumstances was the Bureau of Construction to drill a hole in the armor. The question naturally arose with the chief constructor and all the members of the Bureau, how in the world are we going to build a ship and carry around all this armor and not drill a hole into it—that is, into the outside surface?

After a correspondence extending over a period of about a year, as that was put upon me as the chief constructor when I first entered upon my duties, I did not feel as though I was competent entirely to settle the question how to carry around turrets that weighed 500 and 600 tons without being allowed to attach the deck of the ship to them in

any way at all. So I put that responsibility on each one of the shipbuilders, Mr. Cramp and the Union Iron Works, and I notified them in a diplomatic way that under no circumstances were they to drill any holes in this armor, because I had been so notified by the Bureau of Ordnance. They had a contract to do certain things with their ships, and this was all brand new to them. Consequently, they came back to the Navy Department in the most vigorous kind of a way, and after spending a period of about a year in trying all kinds of methods, drills of every character—a diamond drill would not touch it—the Department found in the General Electric Light Company a skillful man who devised a means by which they could get up a machine and by the application of electricity on the outside of the armor where we wanted to put a hole in it they could so soften the spot without interfering with the rest that we were able to drill a hole in it.

Senator CHANDLER. Softened by electric current?

Mr. HICHBORN. Softened by electric current.

Senator HALE. And that is the way you fasten the plates?

Mr. HICHBORN. That is the way we get along first-rate now; but we had this matter under consideration for about a year before reaching a solution?

Senator CHANDLER. Is there no way you can fasten the armor to the side of a ship without boring holes on the outside?

Mr. HICHBORN. We do not under any circumstances secure side armor from the outside. We go inside and come out to it.

Senator CHANDLER. If the plate is only harveyized on the outside, you have no difficulty in boring in the inside?

Mr. HICHBORN. We have not.

Senator CHANDLER. What would be the objection to boring in the hardened harveyized surface on the outside?

Mr. HICHBORN. The heavy barbettes that hold the heavy guns are arranged on the deck of the ship resting on one deck and extending up through one or more, and we have to fasten the deck plating and big beams and everything that would hold the structure as the ship rolls. We have to fasten everything of that kind to that barbette, and that is why we have to make holes in the outside.

Senator CHANDLER. And you found it impossible to bore these holes until the electric current was applied?

Mr. HICHBORN. Until this device was gotten out.

Senator CHANDLER. To soften the plate where you wanted to bore?

Mr. HICHBORN. Yes.

Senator CHANDLER. Does not this prove the extreme hardness of the harveyized surface?

Mr. HICHBORN. Oh, yes; it demonstrates that fully.

Senator CHANDLER. In fact, then, the process was so successful that it made the plates apparently too hard to be properly worked to put them into the ship in some cases until this method of softening was invented?

Mr. HICHBORN. It left the problem open as to how we were going to complete the ship until they devised this machine.

Senator CHANDLER. This trouble that you found only made the ship, when constructed, much more impervious to projectiles, did it not?

Mr. HICHBORN. The ship is that much better for it.

Senator HALE. It showed that it was exceedingly good armor?

Mr. HICHBORN. Oh, yes; there is no question about that.

Senator CHANDLER. I did not mean to interrupt you, Senator Tillman, but I thought I would bring out that fact. You are entitled to

ask Mr. Hichborn not only what he may know, but whether he has heard anything so that he can put us on the track of it.

Senator TILLMAN. I had heard that such things had happened and I wanted to know whether there was any foundation for it.

Senator CHANDLER. Senator Tillman heard that you had some knowledge, either from your own observation or from hearsay, to the effect that improperly constructed armor plate had been furnished the Government other than that already investigated.

Mr. HICHBORN. That information could never have come from any remark that I made. I am a pretty busy man in my own duties.

Senator TILLMAN. It is not worth while to go back to the source of my information, but I have simply heard that ordinary steel, worth 3 or 4 cents a pound or 2 cents a pound, had been used on the sponsons and on the protective deck plates of some of our vessels, and that this matter had come to your knowledge.

Mr. HICHBORN. I have a subject of that kind referred to me by the Secretary of the Navy at the present time.

Senator TILLMAN. You mean that you have a matter of that kind under investigation now, to test and find out?

Mr. HICHBORN. Yes, sir; to find out.

Senator TILLMAN. Possibly that is just where the whole thing came from. Of course, being charged with the duty of discovering whether the Government has been cheated, we know very well if you find it has been cheated you will make the fact known.

Mr. HICHBORN. That is a matter that I will now take up. It is under consideration.

Senator HALE. That is not as to armor plate? That comes through the Bureau of Ordnance.

Senator TILLMAN. It is armor for sponsons.

Mr. HICHBORN. The question before the Bureau to-day is a letter from the Secretary of the Navy referred to it that has been answered by the Bureau of Ordnance to a certain extent. The statement is made that plates of steel, some of them 1 inch thick, some of them as thick as 2¼ inches, I think—I did not read it very carefully—have been supplied at the rate of 30 cents a pound, and the Department calls for a report from the Bureau of Construction as to where these plates are located and their use, and as to the opinion of the Bureau as to what would be a proper price at which to supply those plates.

Senator TILLMAN. If such a thing has happened an ordinary steel drill would very soon tell you; whereas, if it is not true, you would have to have an electrical contrivance in order to penetrate it?

Mr. HICHBORN. It is nothing that requires any electrical arrangement. It is just a plain nickel steel plate.

Senator HALE. These are the light plates, not the harveyized plates?

Mr. HICHBORN. I make the distinction, 1 inch and 2 inches thick, while the armor, as we talk about it, is, we will say, 15 inches thick.

Senator CHANDLER. Does the case you are now investigating grow out of a request from this committee?

Mr. HICHBORN. I think it does. There is a paper attached to it, I think.

Senator CHANDLER. Sent from this committee?

Mr. HICHBORN. I think, perhaps, your name is attached to it.

Senator CHANDLER. That is the case.

Senator HALE. That came up in the committee. It does not apply to heavy harveyized plating outside, but applies to the light plating which is used *on decks and* sponsons.

Senator BACON. In the testimony which we have previously taken here, from different witnesses, the fact was developed, as I recollect, that under a contract made by Secretary Whitney there was an item for deck plates 3 inches thick, and that before the contract was performed Secretary Tracy came into office and made another contract, by which, in place of the 3-inch deck plating, there was substituted inch plates.

Senator SMITH. Three 1-inch plates.

Senator BACON. Three in number, but each an inch thick, of the same material, and equally as effective for the purpose designed; and it was stated, if I recollect aright, that there was a saving of something over $300 per ton in the difference between those materials. Am I correct in my recollection?

Senator CHANDLER. Substantially.

Senator SMITH. I think the saving was $40,000 on the contract. The Linden people furnished it.

Senator BACON. I have forgotten the names of the parties; I simply recollect the fact that the original contract was under Secretary Whitney, for 3-inch plates.

Mr. HICHBORN. Do you recollect what shape it was?

Senator CHANDLER. It is in Secretary Whitney's original armor contract with the Bethlehem Company. It did not specify the shape.

Senator BACON. And before the contract was completed Secretary Tracy made a modification of it.

Mr. HICHBORN. The shape is always designated in the contract.

Senator CHANDLER. I do not remember as to the shape, but the deck plating that had been put in at armor prices was afterwards withdrawn.

Senator BACON. That is the point. It was a part of the contract in which there was an undertaking to supply not simply deck plate, but the side armor, at the rate of $500 a ton, I believe, and this was put in as a part of the general contract and at the same price. Subsequently thereto Secretary Tracy made a contract by which the 3-inch plates were done away with, and in their place three plates of 1 inch thickness were substituted, and in place of $500 per ton, if that was the price of the 3-inch plates, the 1-inch plates were procured at certainly less than $100 a ton, I think somewhere about $40 or $50 a ton. We would like to know, if possible, even if you have no particular knowledge of those facts, what explanation can be given of that difference in prices. If the original price, $500 per ton, for 3-inch plates was a correct price, how could the inch plates of the same material be furnished at a very much reduced rate, at $40, $50, or $60 per ton? I do not recollect exactly the figure. The record in this investigation will show.

Mr. HICHBORN. I do not carry in my mind any such thing as that ever happening. The records of the Department would show.

Senator BACON. Ex-Secretary Tracy himself testified about it here.

Mr. HICHBORN. That he substituted inch plates in place of 3-inch plates?

Senator BACON. Yes, sir. That was stated by ex-Secretary Tracy in his testimony, was it not, Senator Chandler?

Senator CHANDLER. Yes; but this is the fact, that included in the large armor contract of Mr. Whitney's, amounting to something over $3,000,000, made in order to induce the Bethlehem Company to establish their plant, there was a lot of thin steel plate at armor plate prices, perhaps heedlessly, thoughtlessly. As a matter of fact, it never was *furnished at those* prices, because it being discovered that it was a very

high price for thin plate the specifications never were furnished to the Bethlehem Company. They were withdrawn and Secretary Tracy made a contract somewhere else. I understand that the Bethlehem Company never have furnished any plates less than 8 inches thick.

Senator BACON. I understand that this deck plating was not at all of the same material as armor plating.

Senator CHANDLER. If Senator Bacon will allow me to explain, the point that anything was wrong or any fraud intended is worthy of inquiry. In my belief it was not, and any inclusion of this kind of plate in that contract was accidental. At any rate, it never was carried out. Secretary Tracy stated that he very promptly withdrew that portion of the contract.

Senator BACON. I will state my reason for making the inquiry. As the record now stands, it looks very bad. I do not believe that there was anything wrong in it. I asked the representative of the Bethlehem Company, when he was before the committee, to explain it, and he declined to do so.

Senator CHANDLER. Captain Meigs, who is now here, will be able to explain it, I have no doubt.

Senator BACON. I wanted it explained for the purpose of clearing the matter up.

Senator CHANDLER. Mr. Hichborn, I suppose you know nothing about it?

Mr. HICHBORN. I have only a faint knowledge of it. It occurred about ten years ago.

Senator BACON. Pardon me a moment; I want to complete my statement. I do not wish it to appear that I am asking these questions for the purpose of convicting anybody of impropriety. My purpose is that the record, if it can be made to show that there has been no impropriety, shall so show. As it now stands, without an explanation, it would appear to be otherwise.

Senator CHANDLER. I think "impropriety" is the proper word to be applied to the transaction. I do not want to prevent Senator Bacon from getting from Mr. Hichborn anything that his memory may enable him to state about it. Therefore I should like him to state what recollection he has on the subject.

Mr. HICHBORN. I have only the slightest recollection of it. I know there was some modification of the contract. The question, I think, that came up was as to the high price they were to pay for this very thin material that could be supplied by the ordinary steel maker; that they were paying the same price for these thin plates that they were paying for thick material.

Senator CHANDLER. Can you throw any light upon the question why that happened to be included in the contract by Mr. Whitney?

Mr. HICHBORN. No, sir; not from memory. I could probably do so by searching the records and seeing the correspondence there was on it. I think there was some little correspondence with the Bureau in regard to it, although I am not quite certain about that. That could be brought out by a letter to the Navy Department.[1]

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[1] NOTE.—Mr. Hichborn subsequently furnished the following explanation:

There appears to be some misunderstanding on this subject, so I will give a brief statement of the facts.

The proposal for armor issued by Secretary Whitney February 12, 1887, called for 1,071 tons of protective deck "armor," it apparently being considered at that time that such material could best be made in connection with the armor proper. The contract for *this material* was awarded to the Bethlehem Iron Company at $490 per *ton. These proposals* covered the protective decks for the Maine and Texas, which

Senator BACON. You spoke just now of the ballistic test. I su you mean by that the test of firing a ball against the plate?

Mr. HICHBORN. Yes, sir.

Senator BACON. You spoke, in answer to a question by Senato man, of that as the only test that could be made as to the perfect a plate, or as to its quality. Am I correct?

Mr. HICHBORN. There would be other tests.

Senator BACON. But that is the controlling test?

Mr. HICHBORN. That is what is controlling, sir.

Senator BACON. Of course, every plate is not so tested?

Mr. HICHBORN. No, sir.

Senator TILLMAN. There is one in a thousand tested——

Senator BACON. Wait a moment, please. There is simply one selected as an average specimen plate?

Mr. HICHBORN. Selected from a group.

Senator BACON. Selected from a group, at hazard?

Mr. HICHBORN. Yes, sir.

Senator BACON. They do not permit them to prepare a special for a test?

Mr. HICHBORN. No, sir.

Senator BACON. The idea is that all of them being made unde same process, one of them, selected at hazard, would be a prett average specimen of the others, and what that would endure the may be depended upon to endure?

Mr. HICHBORN. You understand that there are other tests made of the quality of the material before its manufacture. The is tested as to its quality before it is manufactured into the plate and every precaution is taken to insure success.

Senator BACON. Is that ingot manufactured under the inspect a Government officer?

Mr. HICHBORN. Oh, yes; there are officers at the mill all the and they make reports to the Department.

Senator CHANDLER. Are not the cuttings of the plates also te

Mr. HICHBORN. Yes, sir.

Senator CHANDLER. And that is done as to all the plates?

Mr. HICHBORN. Yes, sir.

Senator HALE. There is a very careful inspection all throu there not?

Mr. HICHBORN. There is a very careful inspection as to that, so than ever, I guess, nowadays.

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were the only ships included under the proposal requiring protective deck p The designs of the *Maine* and *Texas* required 1,051 tons of protective deck plat (estimated) tons only of which was 3 inches thick, the remainder being m entirely of 2 and 1 inch plating.

It became evident as the work progressed that it was an inadvertence to i this material as armor, since it was not worth anything like $490 per ton, an understood that Secretary Tracy made arrangements with the Bethlehem Iro pany by which they delivered instead of it a certain quantity of thick armor for other ships at the same price per ton. New advertisements were issued thin plating, and the contract was awarded to the Linden Steel Company at a age price for the two ships of 5.616 cents per pound, or $125.66 per ton.

The 3-inch plating, amounting to about 50 tons, was, however, supplied by hem under the original contract, and is now on the *Maine*.

There was no change in the designed thickness of plating on any of the The only change was the change by which the Bethlehem Company agreed stitute thick armor for the thin protective deck plates originally contracted f withdrawn.

Senator BACON. The inspection, I understand, is very careful, and all practical experience so far has demonstrated that those tests have been efficiently made?

Mr. HICHBORN. Yes, sir.

Senator BACON. And there is no reason to suppose that they have not been thorough?

Mr. HICHBORN. I do not think there is any doubt about the tests being properly made and about the armor being good and perfect at the present time.

Senator SMITH. Since you have held your present position you have drawn the plans for the construction of some of our armored vessels in the navy-yard both at New York and at Norfolk?

Mr. HICHBORN. Yes, sir.

Senator SMITH. They have been constructed by the Government?

Mr. HICHBORN. Yes, sir.

Senator SMITH. You have also had something to do with drawing the plans for similar vessels that were constructed under the contract system?

Mr. HICHBORN. Yes, sir.

Senator SMITH. Will you please state your opinion and judgment as to what is for the best interests of the Government upon the question of building their own ships or having them built by contract?

Mr. HICHBORN. That question is one that often comes up. In my opinion it would be for the interest of the Government to build some vessels in the navy-yards and some vessels by contract. I make that statement very full in my report, if you will care to read it at any time. I go into the details of that, as to why it is for the interest of the Government to keep skilled men and a reliable plant, so that in case of an emergency the Government could also build ships as well as have an efficient force for repairing vessels. I believe that is the custom adopted almost universally by other Governments; at least it was so when I visited the European dockyards. I was sent abroad by Secretary Chandler, and I made that study and submitted the results of my observation in a report, which was printed. I found that although the English, French, Germans, and Russians built some vessels by contract, they always had a certain number building in each of their large yards. I think the principle is a good one. I will submit an extract from the report, pages 27 and 28:

"EFFICIENCY OF NAVY-YARD PLANTS.

"In previous reports the Bureau has called attention to the difficulties which would arise from the completion of certain vessels which had been in course of construction for some years past at the three principal navy-yards. This difficulty now confronts the Department, since the completion of the vessels building at the New York and Norfolk navy-yards has necessitated the discharge of a large proportion of the skilled force hitherto employed at those stations, and it will be exceedingly difficult to maintain the efficiency of the construction and repair plants at those yards unless early measures are taken to give regular employment to a small force of skilled mechanics in each of the principal branches of that department in the above-mentioned yards.

"The most economical and efficient way of maintaining at a navy-yard a force competent to make all the necessary repairs and alterations on ships fitting out is to have some vessel building at such yards, so that,

when there are no vessels under repair, the permanent force can be employed on the new constructions.

"The machinery plants at New York and Norfolk have been installed at great labor and expense, and the present and prospective diminution in the force of mechanics must necessarily result in the partial deterioration of those plants. Other things being equal, the greater the amount of work which is being done at a yard the cheaper the rate of production, since there are certain large fixed charges for maintenance and supervision, these charges continuing quite regardless of the amount of work. The foreman and certain leading men must always be retained, even if there is no work going on, in order that the nucleus of the organization may be maintained. But even under these conditions it is difficult to organize an efficient force of mechanics at short notice, since the best men, when discharged by the Government, will assuredly seek positions elsewhere, and if possible will make arrangements for work where there is some chance of permanency.

"It is thus readily seen that the excessive diminution of the present well-trained forces at the Norfolk and New York navy-yards would result in direct injury to the Government, depriving it eventually of some of its best mechanics, while sensibly increasing the cost of repair work.

"For the above reasons, and in order that the plants at our principal naval stations may always be kept in a high state of efficiency for the performance of the general work of repairing and fitting out, it is earnestly recommended that in future appropriations provision be made for having at least one vessel in course of construction at each of the three principal navy-yards."

Senator SMITH. What important part of the vessel constructed by the Government, outside of the armor plate, is not constructed by them?

Mr. HICHBORN. Almost all of the large castings we have to get from private concerns, and the shaftings, and such things as that. We have not the facilities for forging shaftings or making large castings, but that is only a very small portion of the material required.

Senator SMITH. Nor is it an important portion, in a sense?

Mr. HICHBORN. Ninety-five per cent of the vessel, leaving out the armor and the guns, we could build in one of our navy-yards like Norfolk or New York.

Senator SMITH. We do now construct some of our guns, do we not?

Mr. HICHBORN. Nearly all of the guns for the Navy are made at the Washington Navy-Yard.

Senator SMITH. That is what I supposed. I understood you to except the guns and the armor plate.

Mr. HICHBORN. I should not have done that. I had in view a shipbuilding yard rather than anything else, and at the instant I lost sight of that point.

Senator TILLMAN. Do you believe it practicable or desirable for the Government to undertake the manufacture of its own armor?

Mr. HICHBORN. No, sir; I do not.

Senator TILLMAN. Do you know what the Governments of France, Russia, Germany, and England are now paying for armor, or have you any reports coming from them indicating what it costs those Governments to get their armor?

Mr. HICHBORN. I have no information about it except what is given by the Chief of Ordnance in his reports from year to year. This he occasionally mentions; and he made a separate report to the House *Naval Committee* as to the prices paid abroad for armor. I prepared a

short statement on the armor-plant question which I shall leave with the committee. I understood that was the question on which I was to come before the committee, so I took the liberty to prepare the following:

NOTES ON AN ARMOR PLANT TO BE ESTABLISHED IN WASHINGTON CITY.

The proper location for such a plant would naturally be on water communication, as well as accessible from railroads, since most of the supplies of coal, ore, etc., needed would have to come by rail, while the water frontage and facilities would be necessary to allow of ready shipment to the proving ground.

There is no such suitable locality in this city, as all the water frontage is on alluvial or quicksand soil, which would make it impossible to install some of the machinery without great expense. It is possible, however, that a site might be found on higher ground and away from the water, so that the railroad joining the plant with the water would be short, and the higher ground would make it possible to install all the machinery.

The exact cost of an installation would depend largely upon the location selected, but as a rough estimate I should say that $2,000,000 would probably cover the cost of an armor plant upon a good site, having a maximum capacity of some 350 tons per month. The cost would depend a good deal, too, upon the knowledge and ability of the people in charge of the work.

There is no question that great difficulty would be found in obtaining skilled men to handle such a plant, because they would not feel sure of continued or permanent employment in a factory where there would be periods of great activity, followed by periods of idleness, dependent on appropriations for ships, etc.

A Government armor plant would also not have the financial responsibilities, so to speak, that a private plant has for the delivery of good plates, since armor made by the Government would be tested and passed upon by the Government, and this does not tend to produce good results.

So far from believing a Government armor plant necessary or desirable, I am of the opinion that the present direct relations between the Department and private armor plants are undesirable, and that equally good armor at much cheaper rates would be obtained if the shipbuilder purchased his armor from the manufacturer under Government tests and supervision as he now purchases his structural steel.

STATEMENT OF LIEUT. J. F. MEIGS (RETIRED).

Senator SMITH. Where are you now located?

Mr. MEIGS. I am located at Bethlehem.

Senator SMITH. What are your duties?

Mr. MEIGS. I am the ordnance engineer of the Bethlehem Iron Company, and have been for the past two or three years. I have been at Bethlehem now for about five years.

Senator HALE. Are you in the Navy?

Mr. MEIGS. I was retired from the Navy for color blindness when I came up for promotion to the grade of lieutenant-commander in 1891.

Senator HALE. You are on the retired list?

Mr. MEIGS. I am, sir.

Senator SMITH. The Government has been contemplating the establishment of an armor-plate works. If it should conclude to do so, have

you any objection to giving your opinion and judgment as to wher best place would be to locate it, and what would be the probable c constructing a plant that would manufacture, say, about the qua that is manufactured now at the Bethlehem works?

Mr. MEIGS. I have none, sir. But as regards the locality, I never given the matter any thought, and I fear that my opinion not be worth very much. As regards the cost, I can only speak knowledge obtained from the officers of the Bethlehem Iron Com and I submit that that matter has been better presented to you al by Mr. Wharton than I can present it, and my knowledge must from the same sources as his was derived from.

Senator SMITH. How many tons do they put in their furnace time now when constructing armor plates, and what do they manuf their armor plates from?

Mr. MEIGS. Our largest furnace has a capacity of 50 tons, b have to use a number of them, as the ingots at times weigh as m 150 tons, or close to that figure. I beg your pardon; I do not th have fully answered your question.

Senator SMITH. I want to know what you use in making the st the armor?

Mr. MEIGS. As regards the stock?

Senator SMITH. Yes.

Mr. MEIGS. I can not speak fully on that matter. It varies a deal from time to time.

Senator SMITH. I did not mean the quantity, but just the mat

Mr. MEIGS. I understand you. It varies a good deal from ti time.

Senator SMITH. I may ask you at this point why does it or why s it vary?

Mr. MEIGS. It has varied, for example, from the fact that in th of a Russian contract which we had to execute, and which I h my mind more than anything else, the limits of the compositio not the same as the United States Government had required. W obliged to change the mixture, and we got into a good deal of t about it.

Senator SMITH. In regard to the Russian mixture?

Mr. MEIGS. I do not know that I ought to say we got into tr We came into it, sir, in the way that the phosphorus limit was ver and we were obliged to use for that reason a great deal of muck which, as you know, is an expensive product; and it changed th listic resistance of the plate, in my judgment, and the plate did quite as well as we hoped it would do, though it passed withou culty the test required of it in Russia.

Senator SMITH. The muck bar is very expensive, is it not?

Mr. MEIGS. Yes, sir.

Senator SMITH. You had to use more of it in that contract tha use when you supply our Government?

Mr. MEIGS. Yes, sir; but we did not make as good a plate.

Senator SMITH. What is muck bar?

Mr. MEIGS. It is puddled bar. I say we did not make as g plate because I have full knowledge in that respect. I drew th listic tests that we were required to meet in Russia, and I drew th course, from our knowledge of what we had done in the case tests of the United States plates. Yet, as I have said, for the that the phosphorus limit was low we were obliged to change th ture, and though our plate was made more expensive, it did not

well as the United States plate. That was the principal cause of the change of mixture.

Senator SMITH. In your judgment, what constitutes the best mixture for manufacturing armor?

Mr. MEIGS. I could not say, sir; it is a matter so very difficult.

Senator SMITH. Let me ask another question. Can you not take your pig iron, for instance, and scrap iron with it, and manufacture an armor plate cheaper by that process than by using the two irons?

Mr. MEIGS. I do not think that it is well to try to cheapen those things. It is a very difficult thing to determine in advance. The losses entailed would be very great, and I do not think the promise of success is sufficient to warrant the risk.

Senator SMITH. Have you any objection to stating what is used in the manufacture?

Mr. MEIGS. I do not know, Senator.

Senator SMITH. You do not know?

Mr. MEIGS. Not in a way that would be of any use to you.

Senator SMITH. Now, I should like to ask one other question, and then I will be through. Have you had enough practical knowledge and experience to give the committee an opinion as to whether it is possible or practicable, or is it so considered by experts in the manufacture, that 50 tons of steel in armor plate in one furnace can be manufactured of as good a quality as 10 or 15 or 20 tons?

Mr. MEIGS. Do you mean whether a large furnace or a small furnace is better?

Senator SMITH. Yes, sir. What is the general opinion among experts in manufacturing as to whether a 50-ton furnace can produce as good steel as a 10 or 15 ton furnace?

Mr. MEIGS. The general judgment would be that in a large ingot large furnaces and a small number of them would do better than a very large number of smaller furnaces. That would be the judgment, sir.

Senator SMITH. Then your judgment would be that a 50-ton ingot could be turned out and produced equally as good as a 10-ton ingot?

Mr. MEIGS. Oh, yes. I understood you to say that in making these very large ingots the question which was in your mind was whether it was best to make them in small furnaces.

Senator SMITH. My information from the steel men whom I have consulted in regard to the question is that it is generally acknowledged by all experts that the smaller quantity will produce a much better steel than the larger quantity, and I wanted to get your judgment on that question.

Mr. MEIGS. All the tendency is now to make the furnaces larger.

Senator SMITH. That is, to cheapen the cost of production, of course. I am talking now about the question of quality, not the question of price.

Mr. MEIGS. I should think it would be very dangerous. To begin at the 10-ton furnaces, you would have to have 15 of them, and if anything goes wrong in any of them, if anything goes to pieces, there would be infinite difficulty in such cases. Then there is always trouble about tapping the furnaces and running the metal up to a point to pour it in the mold, and if the furnaces do not succeed each other in proper order, and one gets a little low, or has a point of weakness, the defect in the ingot might not be developed, perhaps, until after it took its shape. I think the judgment is all in favor of large furnaces. But, on the other hand, Krupp makes his guns weighing 50 tons and upward with 100-pound crucibles and his armor plates in big open-hearth furnaces.

Senator SMITH. But not so large as ours?

Mr. MEIGS. Yes, sir; quite as large. My impression is that the furnaces are quite as large as any we have. That is my impression from just seeing them as I passed by.

Senator CHANDLER. On the subject of the delivery of steel ingots of sufficient size to make armor plates and a site for a Government armor factory, will you state what would be necessary for the plant for such a factory upon the site to take steel ingots of sufficient size and make armor of them? What would the plant consist of?

Mr. MEIGS. The plant would consist, probably, of a large forging press, with the necessary appurtenances, and cranes, and gas producers, engines and boiler houses, and a machine shop suitably erected, together with the apparatus necessary for bending the plates, which would include a hydraulic press of large capacity together with its cranes, heating furnaces, and other accessories. It would also include, as armor is now made, an extensive plant for harveyizing armor, and cementing.

Senator CHANDLER. Differentiate the plant for the armor process from the ordinary plant which you have described?

Mr. MEIGS. Yes, sir; I will leave that out.

Senator CHANDLER. What do you require for harveyizing in addition to the other plant?

Mr. MEIGS. You require the furnaces.

Senator BACON. Different from the other furnaces?

Mr. MEIGS. Entirely different.

Senator CHANDLER. And what else?

Mr. MEIGS. The furnaces and the accessories of the building in which they stand, which amount includes expensive cranes and other appliances necessary for moving the heavy weights, and the apparatus for tempering the plates and other minor accessories.

Senator CHANDLER. You have described very rapidly——

Mr. MEIGS. Of course in addition to that you would require a machine shop.

Senator CHANDLER. I want you to describe everything you can think of.

Mr. MEIGS. You would require a machine shop for finishing the plates, an extensive smith shop for making the armor bolts, all the tools necessary for doing that, and for tempering them.

Senator CHANDLER. Is there anything else that you think of?

Mr. MEIGS. I am only mentioning, of course, the principal things. There would have to be a large building, including considerable floor space, in which to erect the armor-plate structure, and this, of course, must be commanded by a crane. I think those are pretty much all the principal points.

Senator CHANDLER. How about a testing apparatus, a building for chemical tests? Are chemical tests not required?

Mr. MEIGS. An enormous number of them.

Senator CHANDLER. Describe the extent to which it would be necessary to have apparatus for chemical tests.

Mr. MEIGS. I could not say anything very definite about that, but as a matter of estimation I should say that the number of chemical tests involved in making a single armor plate are about thirty.

Senator CHANDLER. Chemical tests outside of mechanical tests?

Mr. MEIGS. Yes, sir; some of them are what the chemists call, I believe, complete tests, and others are tests more or less partial for certain elements only. I did not mention the physical laboratory. Of *course the Government* has one or two machines for testing steels phys-

ically. They are, however, inferior to the machines now ordinarily in use—at least I believe they are—unless they have bought some recently.

Senator CHANDLER. Your testimony will be furnished you for revision, and I request you, having taken a bird's-eye view of an armor-plate factory, to add anything that would be needed to make a complete armor-plate factory.

Mr. MEIGS. Yes, sir; I will do so.

Senator CHANDLER. Now, I will ask you to what extent at Bethlehem the armor-plate factory and its various appurtenances are also used for other purposes; for instance, the handling of gun metal, the treating of gun metal, and the making of guns?

Mr. MEIGS. It is used practically for no other purpose.

Senator CHANDLER. The armor-plate plant, then, and all the paraphernalia belonging to it is alone, by itself?

Mr. MEIGS. Purely; it is made special.

Senator BACON. Could it be used for the purposes indicated by Senator Chandler?

Mr. MEIGS. No, sir. We would be very glad to use it, sir. We have the big hammer at Bethlehem, and the big press, both of which are extremely powerful forging tools. The hammer has been standing about six years and the press three or four years. During all that time under those two machines we have made two big rings for the Cataract Construction Company, and that is absolutely all.

Senator CHANDLER. All of the work outside of the armor plate?

Mr. MEIGS. All of the work outside of the armor plate.

Senator CHANDLER. And you have made no use of the plant for handling gun metal?

Mr. MEIGS. None except in the melting department.

Senator CHANDLER. I include the melting.

Senator BACON. I simply wish to know whether or not the failure to utilize this plant for the purpose indicated by Senator Chandler has been due to the fact that you have been otherwise occupied, or whether it is not adapted to the purpose.

Mr. MEIGS. Oh, no; we could make at Bethlehem, as far as forging capacity goes, five times the tonnage of armor plate that we now turn out.

Senator BACON. I understand, then, that this plant is not adapted to the purpose.

Mr. MEIGS. There is no demand for the class of material which it can make. If you have a small forging to make you make it under a small hammer and a small tool. This press is so large that it will tear a small piece of metal all to pieces, and you can not forge it right. According to the size of the material you have to make, you make your forging machinery.

Senator BACON. It would not be adapted to larger-sized guns?

Mr. MEIGS. We have other presses that we make the guns under.

Senator CHANDLER. You have made no practical use of the armor plant for any other purpose?

Mr. MEIGS. We have been unable to make any other practical use of it.

Senator CHANDLER. You spoke of melting pots, but I assumed that you had the steel ingot from a steel-producing plant?

Mr. MEIGS. Yes, sir.

Senator CHANDLER. You do not put the steel ingot into a melting pot for any purpose in making armor?

Mr. *MEIGS. We put it into* the furnaces for heating for forging.

Senator CHANDLER. You take the cold ignot and you heat it t the armor plate either by the hammer or the press?

Mr. MEIGS. Yes.

Senator CHANDLER. But you do not put it into the melting p

Mr. MEIGS. Oh, no.

Senator CHANDLER. When you said that the melting pot wo used, it was a mistake?

Mr. MEIGS. I mean its use outside of that purpose.

Senator CHANDLER. There is no melting pot used?

Mr. MEIGS. Oh, no, sir; not with the ingot after the ingot is

Senator CHANDLER. My question was wholly upon the hyp that you took the steel ingot from the steel cuttings.

Mr. MEIGS. Yes, sir.

Senator CHANDLER. Is there any difficulty in a competent con ing engineer looking at your plant, just as it stands there by its the purpose of making armor and estimating what it would cost Government to reproduce that plant?

Mr. MEIGS. I suppose an estimate could be formed by a person acquainted with such matters.

Senator CHANDLER. I mean a skilled constructing engineer, engineer used to making machinery. You could yourself loo and make an estimate of its cost, could you not?

Mr. MEIGS. I do not think my estimate would be worth much, tor, made in that kind of a way.

Senator CHANDLER. It is all visible?

Mr. MEIGS. Yes, sir.

Senator CHANDLER. The manufacture is purely physical? T no spiritual work that goes into it except the brains of the mana

Mr. MEIGS. That is all, sir.

Senator CHANDLER. Now, a sufficiently skillful engineer can that and see what it is and estimate its cost?

Mr. MEIGS. Yes, sir. There is a good deal of skill required in r such a plant after it is built, and there is a good deal of technical knowledge, too.

Senator CHANDLER. I am not dealing with that point; I am d with the cost of the plant, assuming that it could be used.

Mr. MEIGS. Yes, sir.

Senator CHANDLER. You prefer not to make any statement the cost of the Bethlehem plant?

Mr. MEIGS. I shall be very glad to repeat what I know from th sources that Mr. Wharton got his facts from, but mine would com the same source.

Senator CHANDLER. The cost is all upon their books and it them to furnish it, if it is to be furnished?

Mr. MEIGS. Yes, sir; I could furnish it from the same sources Wharton.

Senator CHANDLER. You have in a general way described, or so, of what the plant consists?

Mr. MEIGS. Yes, sir.

Senator HALE. You do not represent the Government there?

Mr. MEIGS. No, sir.

Senator HALE. Not at all?

Mr. MEIGS. No, sir.

Senator HALE. But you work there in the employment of the lehem Company?

Mr. MEIGS. I am in the employment of the Bethlehem Compa

Senator HALE. Who has the Government there on the duty of inspecting and examining from time to time the work upon the armor plate done by the company?

Mr. MEIGS. Lieutenant-Commander Rodgers.

Senator HALE. Where is he?

Mr. MEIGS. He it at Bethlehem.

Senator HALE. Who else besides Lieutenant-Commander Rodgers?

Mr. MEIGS. Until within a few days Ensign Faust has been there, but he has just left.

Senator HALE. Where is he?

Mr. MEIGS. I do not know, sir. He was ordered to California. I fancy he is on his way by this time.

Senator HALE. How long has Lieutenant-Commander Rodgers been there?

Mr. MEIGS. Lieutenant-Commander Rodgers has been there about a year.

Senator HALE. What is his full name?

Mr. MEIGS. Lieut. Commander John A. Rodgers.

Senator HALE. He is there now?

Mr. MEIGS. He is there now.

Senator HALE. Representing the Government?

Mr. MEIGS. Yes, sir.

Senator TILLMAN. Is he the only Government officer there?

Mr. MEIGS. No, sir; there are two officers of the Army there as well.

Senator TILLMAN. I mean of the Navy. We are not dealing with the Army.

Mr. MEIGS. I have just stated that Mr. Faust, who has been there also, has just gone away.

Senator HALE. The Navy Department usually has two officers there?

Mr. MEIGS. It always has had two officers there until in the last few days.

Senator CHANDLER. Have they no assistants, no inspectors?

Mr. MEIGS. Yes, sir.

Senator CHANDLER. Senator Hale speaks of only two officers, but they have the assistants necessary to make tests?

Mr. MEIGS. Yes, sir.

Senator CHANDLER. Do they employ a Government force or do they utilize your force?

Mr. MEIGS. The companies by contract are obliged to give the inspectors all the assistance they call for, and such assistance is always given. Mr. Rodgers has one clerk.

Senator CHANDLER. Suppose one of these officers sees some steel cuttings from one of the armor plates and says, "I want those cuttings as they have been shaved off there in this machine taken to the laboratory and chemically analyzed;" you furnish the force to do it?

Mr. MEIGS. Yes, sir.

Senator CHANDLER. And suppose he wants a physical test applied by a hammer or by a pressure machine; you are bound by contract to make all the tests which may be required by Government inspectors, are you not?

Mr. MEIGS. Yes, sir.

Senator TILLMAN. Do you mean that the chemical tests are made by their employees?

Mr. MEIGS. Or they would be made here. They have been sent here occasionally. We have rather a complicated system in that respect. I may mention it. I can describe it in a few words. The Government

guaranty in that case is the fact that it sends physical bars, as they are called, bars that can be pulled from time to time to the Watertown Arsenal, near Boston.

Senator CHANDLER. Where there is an Emery machine?

Mr. MEIGS. Yes, sir. We have an Emery machine at Bethlehem.

Senator CHANDLER. Your own or the Government's?

Mr. MEIGS. Our own. It is as good as the one at Watertown, but not so large. Its story is checked from time to time by the machine at Watertown. It has also been the custom of the Government occasionally to make chemical tests, but the ordinary run of chemical tests and physical tests are made by employees of the contractors in the presence of Government officers.

Senator CHANDLER. The Government officer looks on and sees the tests applied?

Mr. MEIGS. He sees whatever he chooses to look at.

Senator CHANDLER. There can be no possibility of deceiving him while those tests are going on?

Mr. MEIGS. No, none.

Senator HALE. The officers attend constantly to the duty of inspection?

Mr. MEIGS. Yes, sir. I think their custom is always to be in the room when the bars are broken.

Senator HALE. And they report from time to time to the Department?

Mr. MEIGS. Yes, sir.

Senator BACON. Are the army officers engaged on the same thing?

Mr. MEIGS. In making guns. The Bethlehem Company is making 100 finished guns for the Government.

Senator BACON. They are in a separate department?

Mr. MEIGS. They are in quite a separate department; they have nothing to do with the armor plate.

Senator HALE. The Army has officers there as well as the Navy?

Mr. MEIGS. Yes, sir.

Senator HALE. On this work of inspection?

Mr. MEIGS. Yes sir; the Army has two officers there, and those officers have a couple of clerks.

STATEMENT OF LIEUT. C. A. STONE (RETIRED).

Senator HALE. What is your relation to the Carnegie Works?

Mr. STONE. I am in the employment of the Carnegie Steel Company; I am their ordnance officer.

Senator HALE. Are you in the Navy?

Mr. STONE. I am a retired lieutenant in the Navy.

Senator HALE. When were you retired?

Mr. STONE. I was retired in 1893 for physical disability when I was about to come up for promotion to lieutenant-commander.

Senator HALE. When did you begin work in the employment of the Carnegie Company?

Mr. STONE. I was sent there by Secretary Tracy in 1891.

Senator HALE. That was before your retirement?

Mr. STONE. Yes, sir.

Senator HALE. What were you sent there for?

Mr. STONE. The Secretary wished me to go there to assist them in the manufacture of armor; to establish it.

Senator HALE. On inspection duty?

Mr. STONE. No, sir; but I had been on ordnance duty when I was

sent there. Of course, I was not sent there officially, but he told me he wished me to go.

Senator HALE. That was while you were on the active list?

Mr. STONE. Yes, sir.

Senator HALE. And they were developing this work?

Mr. STONE. Yes, sir; they had just made their contract with the Government, and the Secretary thought it would be to the interest of the Government, as he told me, if they should have an ordnance officer there.

Senator HALE. How long did you continue to represent the Government? You reported from time to time to the Secretary?

Mr. STONE. I was on leave of absence then, and did not represent the Government any more than I do now.

Senator HALE. I understood you to say that you went there at the request of the Secretary?

Mr. STONE. I did; but I did not represent the Government as an inspector, or anything of that sort. I went at the request of the Secretary to go into their employment, to aid them. He considered that it would be to the interest of the Government that they should be aided.

Senator HALE. Then you went into the employment of the Carnegie Company for some time while you were on leave?

Mr. STONE. Yes, sir; the Secretary gave me a leave of absence.

Senator SMITH. How long a leave of absence did you have?

Mr. STONE. He gave me two years. This was afterwards extended for another year, but I was retired before the expiration of this extension.

Senator SMITH. During that time you were employed by them?

Mr. STONE. I was employed by them.

Senator HALE. Then, when were you retired?

Mr. STONE. I was retired in 1893.

Senator HALE. On what account?

Mr. STONE. On account of physical disability—hernia.

Senator HALE. Were you able to continue your work there during the years before your retirement?

Mr. STONE. Yes, sir.

Senator HALE. Were you in such condition that you could continue in the employment of the company in active duty, and at the same time request and procure retirement?

Mr. STONE. I did not procure it. The doctors found me physically disqualified for promotion, and retired me.

Senator CHANDLER. The examination was not made until the time came for your promotion?

Mr. STONE. No; not until my promotion was nearly due. I had no suspicion of any disability when I went there, and no intention or idea of going on the retired list. That came up afterwards.

Senator HALE. You did not make application for retirement?

Mr. STONE. No, sir; not at all.

Senator HALE. It was the result of a physical examination to which you were obliged to submit when your time for promotion came?

Mr. STONE. Yes, sir; I asked to be physically examined probably a month or so before I would have been examined anyway.

Senator HALE. Expecting to be promoted?

Mr. STONE. Hoping to be promoted, but I hardly expected it at that time.

Senator HALE. Then when you were transferred to the retired list you continued in the employment of the company?

Mr. STONE. I continued in the employment of the company.

Senator HALE. So that you did not in any way represent the G ernment?

Mr. STONE. No, sir.

Senator HALE. You represented entirely the Carnegie Works, you were paid by them?

Mr. STONE. Yes, sir.

Senator HALE. You have continued in that employment ever si

Mr. STONE. Yes, sir.

Senator HALE. I merely wished to bring out the relation of the ness to the Government and the company.

Mr. STONE. Of course, if I had been promoted I should have le employment of the company and gone to sea.

Senator CHANDLER. Have you seen the armor-making plant o Bethlehem Company?

Mr. STONE. No, sir; not for many years.

Senator CHANDLER. You heard Lieutenant Meigs state that have a large hammer, and also a hydraulic press?

Mr. STONE. Yes, sir.

Senator CHANDLER. What have you at the works of Carnegie, Pl & Co.?

Mr. STONE. We have a large press of about the same size and c ity as the one at Bethlehem. We have no hammer.

Senator CHANDLER. Are you expecting to have a hammer?

Mr. STONE. No, sir; we would not consider it necessary to build

Senator CHANDLER. The hydraulic press is sufficient?

Mr. STONE. Yes, sir; we think it is a better forging appliance a hammer.

Senator HALE. Whom has the Government there at the works

Mr. STONE. They have a number of officers. The chief ordn inspector is Commander Horace Elmer.

Senator HALE. Inspector of ordnance?

Mr. STONE. Yes, sir; he is the chief ordnance inspector, and h do with the armor, and so on.

Senator HALE. Who else?

Mr. STONE. He has an assistant, who has gone there lately, na I think, McVay, but I am not certain. I can verify that by the my statement is furnished to me.

Senator HALE. What other officers are there?

Mr. STONE. Besides that, officers under the steel inspection b the chief of which is Lieutenant-Commander Forse, and a numb others—I do not know who they are.

Senator HALE. A number of other officers?

Mr. STONE. Yes, sir.

Senator HALE. Then the Navy Department has several officers t

Mr. STONE. It has several officers there.

Senator HALE. Constantly on inspection duty?

Mr. STONE. Yes, sir. The steel inspection board, as you know, to do with what we call ship material, that is, plates, angles, and s for the hull of the ship. The ordnance inspectors have to do wit armor. They are separate.

Senator HALE. Has the ordnance inspector in dealing with this ter of plate any other officers there, except the first one you mentio

Mr. STONE. Yes, sir; he has an assistant, Ensign McVay.

Senator HALE. He is an officer?

Mr. STONE. Yes, sir; an ensign. There is a commander an *ensign.* We have had as many as three or four at times, but

nearly out of the armor work now, and consequently there is no necessity for so many.

Senator BACON. Is there anyone of the officers there on duty whose physical disabilities would make him incompetent to discharge the duty?

Mr. STONE. I do not know that I could answer that. I do not think that I would be as efficient an inspector as if I did not have the physical disability. That is, I am not as active and as able to be about on my feet as much as if I did not have the physical disability.

Senator BACON. Do you not have to look after the interests of the Carnegie Company with as much physical activity as they have to look after the interests of the Government?

Mr. STONE. I suppose the doctors in retiring me——

Senator BACON. The doctors in retiring you had reference to your ability to serve as an officer on board ship?

Mr. STONE. Yes, sir; as I was going to say.

Senator BACON. Of course, it is no reflection upon you, but simply a reflection upon the policy of the Government in retiring officers physically able to discharge certain duties to which other officers are assigned.

Mr. STONE. I must say, and I think I can say without vanity, that the Government could find work for me to do if it wanted to do so.

Senator BACON. You have not reached the age when you would be retired on that account?

Mr. STONE. Not at all. I am only 48 years old, and I would not be retired until 62. But the Government must and does go by system in regard to such matters.

Senator BACON. You mean it is the present system that it retires an officer by reason of his inability to discharge duties on board ship, when, in fact, there are other duties to which it does assign officers which he would be entirely competent to perform?

Mr. STONE. Certainly, quite well; and even with a little tolerance with reference to his duties on board ship he might very well be employed there too. Lieutenant Meigs was retired for color blindness. He went through all the grades where this was most important, but when he came up for executive officer or for commander he was retired.

Senator BACON. Of course the retirement was entirely proper under the present law. The question is whether the law is right.

Mr. STONE. Certainly; I understand.

Senator SMITH. What is your opinion or knowledge as to the question of your company being able to produce, or anybody else being able to produce, as good a quality of armor plate in a 50-ton furnace as in a 10 or 20 ton furnace?

Mr. STONE. I listened to what Lieutenant Meigs said about that, and I agree with him. I am not a steel expert, and I only know about the practice with reference to armor. On the one hand, there is a very great disadvantage in having so many furnace charges in one ingot. You have to arrange so as to pour them continuously, and the more furnaces you have to arrange for of course the greater the difficulty. I think, in that way, the difficulty due to having a number of furnace charges would far outweigh any slight possible advantage in the quality of the steel in the smaller furnaces. For that reason the tendency is to make the furnaces larger, so that you can cast a 50-ton ingot from one furnace. If you have a 100-ton ingot, or anything between 50 and 100 tons, you must have two furnaces, but you want as few furnaces as possible. I think the consideration in regard to that is weightier than any quality of the steel due to the size of the furnace.

I should like to say one word, which came into my mind when Lieu-

tenant Meigs was being examined, in reference to establishing an armor plant and making armor from ingots furnished from elsewhere. We are strongly of the opinion that an ingot should never get cold; that it should never be allowed to get cold until the plate is forged. The only time, and even that we cut as short as possible, is after the cementation process and before the tempering, when they have to take specimens from the face for the carbon analysis; but, with that exception (and we would not have that exception if we could help it), the ingot is never cold from the time it is cast until the plate is finished. How much there may be in that I do not know, but it would be a matter to consider in case you got ingots from elsewhere, when, of course, you would get them cold.

Senator SMITH. What, in your judgment, makes the best mixture for armor plate?

Mr. STONE. This hardly comes under the head of mixture, but we have tried basic open-hearth steel and acid open-hearth steel, and we consider that we have gotten much the better results from the basic. It is a mere question of the character of the lining of the open-hearth furnace. It must be open-hearth steel by the requirements of the contract, but it may be either basic or acid. We prefer the basic. We have tried both, and we have gotten better results from it. All armor is nickel steel, and you must consider that. To make the nickel steel in the open-hearth furnace we use a certain amount of nickel-steel scrap, as it is called; that is, the cut-off parts, the discard, and so on, from other ingots, from plates made before.

Senator SMITH. Known as scrap steel?

Mr. STONE. Yes, sir; but these are very large pieces, some of them as long as from here to that window [indicating a space of 12 or 15 feet] and this wide [indicating 4 or 5 feet]. We have a large furnace in which those are melted up. The nickel scrap steel has only a percentage of nickel of about 3¼ per cent. So you must introduce more nickel oxide. That has been done in different ways, generally by melting up the nickel scrap with additional oxide so as to make it richer in nickel. Then it is charged in the open-hearth furnace with pig iron and manganese and other lesser ingredients, and lime, to make the necessary charge.

Senator SMITH. Does not the use of scrap iron instead of using the pig iron and manganese cheapen the cost of the manufacture?

Mr. STONE. No; the nickel scrap is worth as much. I will state the reason why it must be used. The ingot that you cast weighs more than twice the weight of the finished plate. That is required to be so. If you furnished new material every time, you would have to furnish double the amount and more of oxide necessary to alloy that new material, and you would be continually accumulating your nickel scrap, which would weigh more than your finished plates. I do not think there is any reason to suppose that nickel steel made entirely from oxide and pig iron, and so on, is any better than that made with a proper amount of scrap. But you can not go too high with the scrap. You can use only a certain percentage of it. That we have tried to use as much as we could, while on the other hand making the best plates possible. We dare not slack up any upon the quality because of the ballistic test and other requirements, yet we try to use as much scrap as possible.

Senator SMITH. Why do you use as much scrap as possible?

Mr. STONE. To begin with, the Government supplies us with the *oxide. It would* not supply us the oxide to waste, and it would con-

sider making new material all the time a perfectly unwarranted waste of oxide.

Senator SMITH. And it would cost more?

Mr. STONE. It would cost more. The Government furnishes us the oxide necessary. We are obligated for an accounting for it and for a careful use of it. The tendency always is to make us use more scrap.

Senator SMITH. The tendency of the Government is to have you use more scrap?

Mr. STONE. Yes, on the one hand, while on the other they hold the requirements over us which we must meet. We can not use all scrap or else the armor would fail. We can not use less scrap than we ought, otherwise we waste the oxide. So between the two forces we are held to a certain course which has been developed in the matter.

The committee, after spending some time in secret session, adjourned.

SATURDAY, *March 21, 1896.*

The committee met at 10.30 a. m., with Senator Perkins as acting chairman.

Horace Elmer, commander, United States Navy, and John A. Rodgers, lieutenant-commander, United States Navy, appeared.

STATEMENT OF COMMANDER HORACE ELMER.

Senator CHANDLER. State your rank in the Navy, your residence, and present duty.

Mr. ELMER. I am commander in charge of steel inspection at the Carnegie Steel Works, Munhall, Pa.

Senator CHANDLER. State, if you please, all your functions at the Carnegie Works.

Mr. ELMER. I have charge simply of the inspection of the armor plate which is being made under the contract of February, 1893. I believe that is the date of the contract; anyway it is just about finished now.

Senator CHANDLER. Is that all the work for the Government which the Carnegie people are doing?

Mr. ELMER. No, sir; but I have nothing to do with the structural steel. That is under the steel board. The work I have charge of is Bureau of Ordnance inspection work.

Senator CHANDLER. State, if you please, what the other work is which is being done for the Government, and who has charge of inspecting that work for the Government at Munhall.

Mr. ELMER. Lieutenant-Commander Forse and his assistants. He has two or three assistants, and they have charge of the inspection of the structural steel being made by the Carnegie Company, which is under the control of the steel board—boiler plate, outside plate, bottom plate, and various kinds of structural work.

Senator CHANDLER. The steel which they furnish which goes into the hulls of Government ships?

Mr. ELMER. That is under Forse and his assistants. It is under the steel board, and he is their representative.

Senator CHANDLER. Is there any gun metal included in that contract?

Mr. ELMER. No, sir.

Senator CHANDLER. The Carnegie Works are not furnishing any gun metal?

Mr. ELMER. They have been figuring on it, but they are not furnishing any. I have charge of all the ordnance work.

Senator CHANDLER. State, if you please, how much armor you have inspected and whether the present contract work is done or about done.

Mr. ELMER. The present contract is nearly done. I have been on duty there just six months. The present contract was made in February, 1893. So it is only the last end of it that I have had charge of.

Senator TILLMAN. Who was your predecessor?

Mr. ELMER. My immediate predecessor was Lieutenant Wilner, and before him, Commander Courtis.

Senator TILLMAN. How long did those two stay, respectively?

Mr. ELMER. I do not remember exactly, but I think Commander Courtis was there over a year and Wilner was there as an assistant and afterwards in charge temporarily for perhaps two years. The armor plant delivered in the last month, February, more than 650 tons, which was the largest delivery, I think, that they have ever made there of armor manufactured.

Senator CHANDLER. And, in round numbers, you have inspected how many tons?

Mr. ELMER. Not more than a thousand, I think. Still, I have not looked at that carefully.

Senator CHANDLER. A thousand, more or less?

Mr. ELMER. A thousand, more or less.

Senator CHANDLER. State, if you please, what assistance you have in the inspection. What constitutes your inspection force?

Mr. ELMER. I have one ensign as an assistant.

Senator CHANDLER. What is his name?

Mr. ELMER. Ensign McVay—C. B. McVay, and one writer.

Senator CHANDLER. Is the writer paid by the United States?

Mr. ELMER. Paid by the day, by the United States.

Senator CHANDLER. Is that all the force you have that is paid by the United States?

Mr. ELMER. Yes, sir.

Senator CHANDLER. What force, if any, is furnished you by the Carnegie Company?

Mr. ELMER. A young woman typewriter, who copies the letters. The mail goes through me, and she copies the communications on both sides for their files and mine.

Senator CHANDLER. That is your whole force?

Mr. ELMER. That is all, sir.

Senator CHANDLER. If any chemical or mechanical tests are applied, the necessary additional assistance for those tests is furnished by the Carnegie Company, is it not?

Mr. ELMER. All chemical tests in our inspection in ordnance are made by the Carnegie Company. The physical tests we make ourselves; that is, my assistant pulls the test himself.

Senator CHANDLER. What inspection do you give of the chemical tests? How much do you see of those tests except the reported result?

Mr. ELMER. Nothing of any practical importance. We take their results.

Senator CHANDLER. You take the paper report?

Mr. ELMER. We take the paper report.

Senator CHANDLER. You have access to the laboratory?

Mr. ELMER. Certainly; and I go in and look at it occasionally.

Senator CHANDLER. You could see it from beginning to end, if you *chose?*

Mr. ELMER. I could, but really you have to do it yourself to make it of any value.

Senator TILLMAN. You consider the chemical test, then, as worthless?

Mr. ELMER. No, sir.

Senator TILLMAN. It is worthless so far as you are concerned?

Mr. ELMER. It is instructive. It is for information.

Senator TILLMAN. But so far as affording you the means of judging of the value of the product so as to catch people on the contract, it is worthless to you?

Mr. ELMER. It is worthless as far as judging whether they are deceiving us or not. As far as telling the condition of the metal, of course it is——

Senator TILLMAN. It is for their own use and benefit. In knowing what is the condition of the iron, and what are the ingredients, and all that kind of thing, of course I can see that it is valuable to them, and if they are trying to act honestly it is all very well; but unless there is some check, some safeguard by which you can decide in behalf of the Government whether the steel is in compliance with the contract and meets the requirement, of course the test is a mere humbug.

Mr. ELMER. Yes, sir; as far as any such purpose as that is concerned. Of course we have other ways of seeing whether they make us good steel or not. The final one is the ballistic test, which, of course, is the important one. But the chemical test is instructive to them, and also to me. The moment that an ingot is cast and they take the analysis they furnish me with a copy of it.

Senator PERKINS. Do you take a sample of each ingot and try its tensile strength?

Mr. ELMER. Oh, yes; each plate three or four times during the process of manufacture, because there are apt to be alterations.

Senator CHANDLER. As a matter of fact, you know there is a chemical laboratory there?

Mr. ELMER. Yes, sir.

Senator CHANDLER. And you have no reason to doubt that the chemical tests are made as stated?

Mr. ELMER. No, sir. I go in there and see them made at times.

Senator CHANDLER. But you rely entirely for the accuracy of those tests upon the officials of the Carnegie Company?

Mr. ELMER. Yes, sir.

Senator CHANDLER. It is suggested by Senator Perkins that you shall be asked to describe what chemical tests are made.

Mr. ELMER. They are made in accordance with specifications that the Department has required. After the ingot is cast——

Senator CHANDLER. State the weight of the ingot.

Mr. ELMER. That would depend on the final weight. The ingots they cast run as high as 200,000 pounds, but that would be for one of the large barbette plates that would weigh probably 40 tons when finished. They make the ingots according to the weight of the plates.

Senator CHANDLER. Assume that a great steel ingot from which a large plate is to be made is ready to be converted into an armor plate, when do you begin to apply mechanical tests to it and when do those tests end?

Mr. ELMER. We begin the moment that we are notified it is going to be cast. Then we go and look at the casting, etc., and watch its process. Then as the ingot is cooled, if a small one it will go to the roller merely, but being a large one it will go to the press shop to be forged down into *what they call* a slab, approximating a plate, but not of the

exact dimensions. After that has been forged down under the pr
that condition we take what is called the first grading test. We
in at the place prescribed by the Bureau of Ordnance both at the b
and the top of the plate, because a great deal of the top of the plat
to be discarded anyway. About 60 per cent on an average is disc
from every ingot. We take the physical specimens from the bottor
top according to what is prescribed in the specifications, and the
tested for their tensile strength and their elongation. That is do
this case by my assistant, Mr. McVay. He always pulls those
himself, or if he is not there I do it. The specifications prescribe l
below which the tensile strength can not go and below which the
gation can not go. We get that, and that is the first, the grading

Senator CHANDLER. State the machine by which that is done.

Mr. ELMER. I do not think I can give you the name of it.

Senator CHANDLER. It is a particular machine?

Mr. ELMER. Oh, yes, sir; it is a machine of a perfectly good
established character.

Senator CHANDLER. Belonging to the company?

Mr. ELMER. Belonging to the Carnegie Company. They are req
to provide that by the contract.

Senator CHANDLER. That is a complete and satisfactory machi

Mr. ELMER. Entirely so.

Senator CHANDLER. And it gives you with mathematical acc
the tensile strength?

Mr. ELMER. Yes, sir. I really think there is much in having
person make all these tests, because there is a little personal equ
about all of it.

Senator CHANDLER. You pull it until it gives way; and what
Do you bend it until it gives way?

Mr. ELMER. No; we pull it simply, and that gives us the te
strength, and, besides, it also gives us the elongation. The elong
is quite as important as the tensile strength.

Senator CHANDLER. That is for the shaftings. The number of i
to which it stretches before it gives way?

Mr. ELMER. The percentage of the entire length which it stret
For instance, in armor we will not accept anything less than 12 pe
elongation. It must stretch 12 per cent of a given length.

Senator TILLMAN. You mean that it must stretch before breal

Mr. ELMER. Before breaking.

Senator CHANDLER. Have you described the whole of the first

Mr. ELMER. That is the first, what is called the grading test.
tells us the quality of the steel. Before that we have had the phy
analysis which they have made from the ladle; the hot steel is t
out as it is poured into the flask to make the ingot. They take
ladleful and make what they call a ladle analysis to tell whether
have enough carbon, manganese, or the different ingredients of
So we know, so far as their chemical analysis will tell us, somethi
the character of the steel. Then comes the physical test, whic
make ourselves, and then, after the grading test, the plate is sent
the machine shop and cut down to the approximate measure.

Senator CHANDLER. Describe how the ingot is cut down.

Mr. ELMER. It has been first elongated under the press and i
been made into a slab.

Senator CHANDLER. How is it cut down to the approximate si
the plate?

Mr. ELMER. You take this great press, with a knife edge, and s

it right through the steel. You cut it up, and then take it over to the machine shop.

Senator CHANDLER. Is that done cold?

Mr. ELMER. It has to be done hot. Then it is taken over to the machine shop and put on a machine by which it is cut off to an approximate size—not exactly the size; the exact size is final work, but the approximate size—before it is carbonized. Then comes the carbonization.

Senator CHANDLER. Take each step, but not at great length. It is first approximately cut down, and then how is it handled?

Mr. ELMER. It is then taken to be carbonized for the Harvey process.

Senator CHANDLER. At that stage?

Mr. ELMER. It is approximately of the size, approximately of the thickness, and it is afterwards forged down.

Senator CHANDLER. The harveyizing is done before the plate is exactly cut to shape?

Mr. ELMER. Yes, sir.

Senator PERKINS. Did you state that about 60 per cent of the ingot is available for the purposes for which it is intended?

Mr. ELMER. Sixty per cent is discarded and only about 40 per cent is available.

Senator PERKINS. From what part of the ingot do you take the 40 per cent?

Mr. ELMER. We take it from the bottom. The top is where the poorest steel always is, and the fact is it is the great trouble to get them to cut off enough. The bottom is always better.

Senator PERKINS. Do you cut off the ends of the ingot?

Mr. ELMER. Always a little off of the bottom end and the larger part off the top end. The top end is always the poorest steel.

Senator CHANDLER. As the ingot comes out of the furnace, is it longer vertically than it is horizontally?

Mr. ELMER. They make the flask, of course, as they please, but it is according to the weight of the ingot which is made.

Senator TILLMAN. It is something like a barrel?

Mr. ELMER. Except that it is not round. It is generally square or rectangular.

Senator CHANDLER. Twice as long as thick?

Mr. ELMER. As a rule.

Senator CHANDLER. I made this inquiry because you spoke of the top.

Senator PERKINS. The top is the poorest.

Senator CHANDLER. As it is in the furnace?

Mr. ELMER. No, sir; that is after it goes into the flask. It cools off in the flask. The steel is poured out of the furnace into great ladles, and the ladles are poured into the flask.

Senator CHANDLER. And the poorest is the top of the flask?

Mr. ELMER. The top of the flask.

Senator CHANDLER. The top of the molding?

Mr. ELMER. Yes, sir; the impurities of the metal gather in the top.

Senator CHANDLER. And the bottom is the best?

Mr. ELMER. The bottom is the best.

Senator PERKINS. It is the 40 per cent taken from the lower end that you utilize?

Mr. ELMER. Forty per cent of the lower part of the ingot.

Senator TILLMAN. Less than the lower half?

Mr. ELMER. Yes, sir.

Senator CHANDLER. Have you described all the tests that are a to the armor?

Mr. ELMER. No, sir; only the first.

Senator CHANDLER. So I understood. Now go on. You ha scribed it to the point where it is ready to have the Harvey proc

Mr. ELMER. And you do not care to have that process desc The plate is sent to be forged, so that it is all brought down to its urement and thickness. After that the second physical test is It is cut off then nearly to the measurement, leaving only a strip a the edge in excess of the final dimensions. The determining test physical characteristics is then taken; that is, we take the deter test as to tensile strength and elongation. There is a third test finally, after all the work is done, called the uniformity test, but t only for the purpose of information, the hardening and tempering ing before that.

Senator PERKINS. You have no voice in the first ingredients steel?

Mr. ELMER. Not at all.

Senator PERKINS. All you ask for is results?

Mr. ELMER. All that we ask for is results, and they must mal steel to give those results.

Senator CHANDLER. Have you described all the tests applied Government at present?

Mr. ELMER. Yes, sir; all the physical tests. Then we have the urements. Of course every plate is exactly according to the l breadth, and thickness required; and then, finally, we have th listic test.

Senator CHANDLER. So far as the strength of the armor is conc you have described everything that takes place at the works?

Mr. ELMER. Everything at the works.

Senator CHANDLER. There is nothing left by way of test before it is delivered by the contractor except the ballisti tests?

Mr. ELMER. No, sir.

Senator CHANDLER. Now, state what plates are selected an they are selected for ballistic tests.

Mr. ELMER. The inspector keeps a record of the plate fro beginning when it is cast until the end. He has a sheet in wh puts down the chemical character and the physical tests of the and everything about its history and its carbonization, and a sort of thing. It is an absolute history of it. As the time appr for the ballistic test the inspector looks through this careful selects out a plate which he thinks to be the poorest and sends t for the ballistic test.

Senator CHANDLER. What is the proportion of plates select tests? What is the rule?

Mr. ELMER. One out of every lot, and the lot, generally, is fr to 300 tons.

Senator TILLMAN. How many tons are there in a plate?

Mr. ELMER. In the larger plates about 40 tons; in the smaller about 10 or 15 tons.

Senator TILLMAN. What are their dimensions?

Mr. ELMER. The plate of 40 tons would be a barbette plate f of the battle ships, about 15 or 17 inches thick.

Senator TILLMAN. And it would be of what length and width?

Mr. ELMER. It would be 8 feet or 8½ feet wide, perhaps. I *remember* the dimensions. Of course, I have not all the figures

should say 18 feet long and 8½ feet wide; but we never give those dimensions in speaking of them; we would speak of it as a plate 17 inches thick. The plates such as I have recently sent out for the barbette of the *Iowa* would weigh about 40 tons. Seven-inch turret plates would weigh, perhaps, 10 to 12 tons. So the plates are of varying thickness and varying width, and they are grouped together by order of the Bureau, so many hundred tons of a similar character.

Senator TILLMAN. When you take large plate like that to test it for the ballistic test it costs $20,000. Who loses it?

Mr. ELMER. If the plate passes and is accepted, the Government pays for it. If it fails, the contractor loses.

Senator TILLMAN. If the Government chooses to ruin a plate by boring a hole through it with cannon, if it was good, it is then of no further service?

Mr. ELMER. That is the only way in which you can find out whether it is really good.

Senator BACON. What is done with the plates that are ruined after the test?

Mr. ELMER. There are two things we do with those plates. First, that plate makes us sure of all others of a similar character. Then again, we use that plate for testing shells. You have got to test the shells, and when a man makes an armor-piercing shell you want to know whether the shell will go through the armor. Therefore, the plate is useful for such purposes and it is useful for other purposes.

Senator BACON. After you have practically destroyed the plate, is not the material valuable? Can it be recast?

Mr. ELMER. Yes; it can be used as nickel scrap.

Senator BACON. Whose property is that? What becomes of it? If the Government pays for the plates, it is the Government's property. What does it do with it?

Mr. ELMER. It will probably sell it back to Carnegie. However, I do not know that that has been done.

Senator BACON. I am not asking for probabilities; I am asking you if you know?

Mr. ELMER. It has not been done, because the Carnegie Company has more nickel scrap than it knows what to do with. It is all around the place. So I do not know that anybody is buying it, but they can buy it. That would be the only possible disposition that could be made of it.

Senator BACON. This, I understand, is nickel steel?

Mr. ELMER. Yes, sir.

Senator BACON. After it has had the nickel combination, it is still available to be put in the furnace and remelted and recast?

Mr. ELMER. Yes, sir.

Senator BACON. Is not the expensive process in combining the nickel with it and the harveyizing it that which constitutes a very large part of this expense?

Mr. ELMER. The Harvey feature does not affect its value as scrap; that is, you can draw the temper from it.

Senator BACON. You do not comprehend my question. We have paid $500 a ton for the material for these plates. A part of that cost, of course, is in forging, but what I want to know is if it is not true that a material part of that cost has been incurred in making the nickel combination and in harveyizing it?

Mr. ELMER. Yes, sir.

Senator BACON. What cost would you say is embraced in those two processes?

Mr. ELMER. I am afraid that would be very difficult for me to answer.

Senator BACON. Approximately. You can tell whether it would be one-fourth, one-third, or three-fifths. Of course I do not ask you to state it accurately, because I suppose you have never figured it out, but you must have some idea on the subject. Here is steel worth probably $40 a ton, which, by virtue of these various processes, has been converted into a material worth $500 a ton. The question I ask is, What approximate proportion to the entire cost is represented by the two processes of the nickel combination and the harveyizing?

Mr. ELMER. That is due to the alloy of nickel and the harveyizing?

Senator BACON. Yes, sir.

Mr. ELMER. For instance, for harveyizing we have been paying an average of three cents per pound.

Senator TILLMAN. That is $60 a ton.

Mr. ELMER. Sixty dollars a ton.

Senator BACON. I want to know if you can give me the approximate cost, or near the approximate proportion of cost, represented by these two processes. I want to find out, if I can, the value of this material after it has been ruined as a plate when it is still available for other uses.

Mr. ELMER. That I can tell you. It is not of any value except to melt up again.

Senator BACON. I can understand that.

Mr. ELMER. In regard to the other point, I am quite sure that they cover fully a third.

Senator BACON. The two together?

Mr. ELMER. The nickel and the harveyizing. They do not cover a half, but I should think that they cover possibly a third of the expense of making the plate. For the harveyizing process we have been paying $60 a ton. The nickel oxide is worth 40 cents a pound. You can make the calculation. I have not done it. In my business in inspecting there I have had no particular reasons to know about the value of the ingredients except such as I have informed myself upon, but the nickel alloy that we use is 3¼ per cent.

Senator BACON. I understand you to estimate the proportion of the entire cost of these two processes to be about one-third?

Mr. ELMER. Yes, sir; I think about a third.

Senator BACON. And after it has been ruined as a plate by the ballistic test, that metal, then, is still worth between $100 and $200 per ton?

Mr. ELMER. No, sir.

Senator BACON. It is still available to be remelted, is it not?

Mr. ELMER. Yes, sir.

Senator BACON. And it has already gone through these expensive processes, which will not have to be repeated if it is again converted into plate?

Mr. ELMER. The Harvey process has to be entirely repeated.

Senator BACON. Because that is a surface process.

Mr. ELMER. In every cast that is made there is a certain proportion of nickel scrap. If you like, I can point out just the proportion of nickel scrap.

Senator BACON. No, that is a detail which it is not necessary to give. I want to get at something specific and definite that can be put into a much smaller compass. The process of combining the nickel with the steel does not have to be repeated if the scrap steel is again melted?

Mr. ELMER. No; that furnishes a portion of the nickel.

Senator BACON. What I want to know is the value of that ingot of steel with the combination of nickel. I do not know by what name you call it. Is it the nickelizing process?

Mr. ELMER. It is nickel alloy.

Senator BACON. What is the value as crude material of that combination of steel and nickel?

Mr. ELMER. I am unable to give it to you from memory. I have the data somewhere, as I stated, and I have been looking for it, but I do not find it here.

Senator BACON. But the fact exists that as a material it is just as good as if it had never been used. The only part of the process which has cost money which is no longer of value is the harveyizing process. That being a surface process, of course it would have to be gone over again. Is that correct?

Mr. ELMER. That is, of course, entirely useless, and so of course as to all the machining and all those other features.

Senator BACON. But I am speaking of it as material.

Mr. ELMER. The material can be used as a portion of the heat in making another cast.

Senator BACON. So far as you know, no disposition in the way of sale is made of the large amount of material which is destroyed in the ballistic tests?

Mr. ELMER. Oh, I think there is, sir; but that I do not know.

Senator BACON. Is there any representative of the Government there besides yourself?

Mr. ELMER. I have not anything to do with that. That is done at Indian Head, and it never comes back to Carnegie.

Senator BACON. You have made no ballistic tests at Carnegie's?

Mr. ELMER. The ballistic tests are made at Indian Head; none are made at Carnegie's.

Senator BACON. Do you select the plate that goes to Indian Head?

Mr. ELMER. Yes, sir.

Senator BACON. The only plate that goes there which is used for that purpose?

Mr. ELMER. Yes, sir.

Senator BACON. You were describing the processes, and I supposed you were describing the processes which were under your immediate supervision.

Mr. ELMER. It is all under my supervision up to the time the ballistic plate goes to Indian Head.

Senator BACON. I understand that the chemical test is not under your supervision?

Mr. ELMER. No; they make it and report to me. The result is sent to me; but it is not under my supervision in that sense.

Senator BACON. It is not under your supervision?

Mr. ELMER. No, sir; it is not.

Senator BACON. And the tensile test is made by your assistant?

Mr. ELMER. Yes, sir; or by me, as the case may be.

Senator BACON. What is the part of the inspection of this material which is under your personal supervision?

Mr. ELMER. We watch the plate from its casting until the time it leaves the works, through all its processes.

Senator BACON. That is what you give personal attention to?

Mr. ELMER. Yes, sir; what is called the physical test is the test which gives the tensile strength and the elongation, and that is done by my assistant.

Senator BACON. In your department?

Mr. ELMER. Yes, sir.

Senator BACON. That is the only direct test which you make yourself?

Mr. ELMER. Yes, sir; it is the only test of the metal. The chemical test is made by the company and the ballistic test is made by the Government at Indian Head.

Senator CHANDLER. You have stated that of the steel ingot that comes out of the flask probably 60 per cent is rejected from the plate.

Mr. ELMER. Yes, sir.

Senator CHANDLER. Will you state what knowledge you have, if you have any, as to the disposition that is made of the 60 per cent that is cut off from the ingot? Is that cut up and put into the melting furnace again?

Mr. ELMER. Yes, sir; a portion of it, as I said. There is still a lot of it on hand there. The question is now in adjudication between the Bureau of Ordnance and the Carnegie Company as to its disposition.

Senator CHANDLER. That being near the steel works, the only reason why it can not be used profitably is the expense of cutting it to pieces?

Mr. ELMER. It is used. It is cut up. I have the exact figures here showing that in a cast of 100,000 pounds there would be perhaps 60,000 pounds of scrap.

Senator CHANDLER. And that comes from cutting up the large pieces?

Mr. ELMER. Yes, sir; cutting up the scrap.

Senator CHANDLER. I understand that you not only superintend the work on the ingot after it is taken in hand by the armor-plate makers, but from the platform of the furnace you observe the making up of the charge into which are put the ores of such kind, and the iron of such kind, and so much scrap steel, and so much nickel, making the charge. You observe that?

Mr. ELMER. We follow, as far as possible, all the processes, but we have no control whatever over that portion.

Senator CHANDLER. It is not a part of your duty, under your instructions, to do that?

Mr. ELMER. No, sir.

Senator CHANDLER. But as a matter of fact you do follow the processes?

Mr. ELMER. As a matter of fact we try to follow all the processes.

Senator CHANDLER. The steel works being at the armor-plate works, you notice the way the furnaces are charged?

Mr. ELMER. Not so much the way they are charged as the way they are drawn. We try to be there to see them draw the steel when the ingots are cast.

Senator CHANDLER. When they pour it into the flask you observe it?

Mr. ELMER. Yes, sir. The charging part we do not often see. It is not in fact under our control.

Senator SMITH. What would it cost the Government to establish a complete plant adjoining the Cambria Works?

Mr. ELMER. I have never been to Cambria, and do not know the locality, if there is anything depending on that.

Senator SMITH. If you wanted to erect an establishment for the harveyizing process, taking the ingot from the steel works such as at Cambria, who, I understand, are now in a position to make light armor, from your experience can you give some idea as to what it would cost to add to that establishment, in order to make the harveyizing process complete, or what it would cost to put up a plant for harveyizing if the steel were ready to be harveyized?

Mr. ELMER. I am afraid there is nothing at all in my experience that would warrant me in more than guessing. I have nothing to do with the cost of the works.

Senator SMITH. You do not know what the furnaces would be apt to cost?

Mr. ELMER. No; I do not know what the probable cost would be.

Senator SMITH. You then have practically no knowledge of the cost of the machinery necessary to make an armor plate?

Mr. ELMER. No, sir.

Senator SMITH. You have no general idea as to what the cost is to the Carnegie people for the armor plate furnished the Government?

Mr. ELMER. Yes, sir; I have some idea.

Senator SMITH. Will you state what it is?

Mr. ELMER. I should like to say that my duties there have nothing to do with the charge and the cost of the works. I can give merely my approximate judgment.

Senator SMITH. I ask you to state the cost approximately.

Mr. ELMER. I can not see how that armor can cost the Carnegie Steel Company more than $250 a ton anyway—that is, leaving out all interest in the plant, or how much the plant cost, or how much there is of wear and tear. I merely take the basis of the metal to begin with, and go through the whole process to the end.

Senator SMITH. Outside of the question of capital invested and the wear and tear of machinery?

Mr. ELMER. Outside the question of wear and tear.

Senator TILLMAN. To make that fuller, let me ask you, in the event of the Government establishing its own plant where there was another plant equally as well equipped in existence, do you think that the Government itself or the proprietors of the other plant could make for $250 a ton the armor for which we are now paying $500 a ton?

Mr. ELMER. Do you mean to exclude the idea of the cost of the plant?

Senator TILLMAN. I am speaking about a plant duplicating the one which now exists at Carnegie's works. Would the necessary skilled labor and the material and the supervision entail a cost in producing armor of more than $250 a ton?

Mr. ELMER. I do not think so.

Senator SMITH. Now let me ask you one question and I am through.

Mr. ELMER. May I modify that statement thus far? In order to make armor at such a rate it would be necessary to work continuously. You could not do it by working eight hours a day. You would have to work night and day.

Senator TILLMAN. It would be necessary to have relays of hands—shifts?

Mr. ELMER. Yes, sir.

Senator TILLMAN. Working how long?

Mr. ELMER. Twelve hours on and twelve hours off.

Senator SMITH. Is there any other statement which you wish to make in this connection?

Mr. ELMER. No, sir.

Senator SMITH. Have you ever heard it suggested, or have you ever heard from any reliable source, that the manufacture of armor plate is a monopoly which extends not only to this country, but includes all of Europe?

Mr. ELMER. No; I never heard that stated. In fact, I do not think I ever heard the matter discussed.

Senator SMITH. You never heard it discussed?

Mr. ELMER. No, sir.

Senator SMITH. You never heard that in Europe the armor-plate manufacturers have a combination, or, in other words, that they have an association of any kind or character whereby uniformity of prices is maintained?

Mr. ELMER. No; as I say, I have never heard that discussed.

Senator SMITH. You never heard the question discussed as to why on the second contract with the Russian Government our people got such a large advance in the price over the price of the original contract that they took?

Mr. ELMER. I do not know anything about that matter. I have never said a word to Carnegie officials about the Russian prices. I do not know a thing about it. I have carefully avoided any talk with the Carnegie people about prices.

Senator SMITH. You have not even heard anything of that kind intimated?

Mr. ELMER. I have not.

Senator CHANDLER. When Lieutenant Meigs was here last Saturday, at the request of the committee he described the plant of an armor-plate factory—the furnaces, the cranes, the hammer, the press, the harveyizing furnaces, and everything he could think of as constituting a plant which would be necessary to deal with a steel ingot taken from the steel works in order to make it into armor plate. Is there any difficulty, in your judgment, in looking at such a plant, taking measurements of it, and making an estimate as to what it would cost to reproduce it for the Government if the Government desired such a plant?

Mr. ELMER. I do not see why there should be any difficulty.

Senator CHANDLER. Could competent persons make such an estimate?

Mr. ELMER. You have the estimate of the Bureau of Ordnance, you know, Senator.

Senator TILLMAN. On that special line?

Mr. ELMER. Yes, sir.

Senator CHANDLER. As to the cost of the plant?

Mr. ELMER. Yes, sir.

Senator CHANDLER. I am not familiar with that.

Mr. ELMER. Captain Sampson made such an estimate.

Senator CHANDLER. In what detail is it?

Senator SMITH. We have it before the committee.

Senator CHANDLER. It is an estimate giving the gross amount.

Mr. ELMER. It gives a portion for press, a portion for the machine shop, a portion for the harveyizing furnaces, a portion for open-hearth furnaces.

Senator CHANDLER. There would be no difficulty in making such an estimate?

Mr. ELMER. No, sir.

Senator CHANDLER. Could you either alone or with other naval officers make a reasonably reliable estimate of what it would cost to put up an armor plant for the United States?

Mr. ELMER. I think it could be done. The great difficulty would be that those who know best are the ones who have put up the plants, and they might not choose to give the information. I think we could come close to it.

Senator CHANDLER. Can not you tell by looking? You can go into *a machine shop*, and, looking at a large lathe, from what you know of

machinery as a line officer in the Navy could you not make an estimate of what it would cost to reproduce that lathe?

Mr. ELMER. I could make an approximate estimate.

Senator CHANDLER. Could you not look at the steam press and the steam hammer and see what their physical parts are, and then make an estimate of what it would cost to reproduce them?

Mr. ELMER. The press was made by Whitworth in England. I do not think any of them have been made in this country. (To Mr. Rodgers:) I do not know whether your press was made in this country.

Mr. RODGERS. The big one was.

Senator TILLMAN. You can get the price of the hammer by writing to the factory?

Mr. ELMER. Yes, sir.

Mr. RODGERS. The big press was made at the works. They bought two from Whitworth.

Senator CHANDLER. You can look at the large castings and estimate what those cost, and you can look at the smaller parts of the machines and estimate what they would cost, and then you can make an estimate of what it would cost to put them up. Is not all that feasible?

Mr. ELMER. The estimate would be approximate. We could not make anything like an accurate estimate.

Senator CHANDLER. I understand that. Assume that Congress desired to provide for a Government plant; would there be any serious difficulty in having a board of naval officers make an investigation and submit a reasonably safe and judicious estimate of what the plant would cost the Government?

Mr. ELMER. I think none whatever.

Senator CHANDLER. Is there anything now secret or mysterious about the plant, so that the estimate could not be made?

Mr. ELMER. No, sir.

Senator CHANDLER. Have you ever participated in making an estimate of that kind?

Mr. ELMER. No, sir; nothing beyond the merest guessing.

Senator CHANDLER. You know of no estimate except that which was made by Commodore Sampson, Chief of the Bureau.

Mr. ELMER. No, sir.

Senator CHANDLER. You had nothing to do with making that estimate?

Mr. ELMER. No, sir; I had nothing to do with making it.

Senator CHANDLER. Do you know whether he made his estimate as the result of an inspection either of the Bethlehem plant or of the Carnegie plant?

Mr. ELMER. He is quite well acquainted with both.

Senator CHANDLER. Do you know whether he had any drawings or descriptions of the different parts of those plants in making the estimates?

Mr. ELMER. I do not.

Senator BACON. From the fact that you ship the specimen plate for the ballistic test, I will ask you whether you have any information as to the cost of transportation between the works and Indian Head?

Mr. ELMER. I can not give you the rate now, but the bills all pass through my hands and are certified to by me. I have all of that information, of course, at my office.

Senator BACON. You have no recollection, even approximately, of what the cost is?

Mr. ELMER. I do not remember.

Senator TILLMAN. I should like to ask you whether, in getting up an estimate, provided you were placed on a board of that kind, detailed for that duty, you would naturally desire to have the assistance, either voluntarily or at Government expense, of some large iron or steel manufacturer whose familiarity with all the details and technique and experience also in the expense of cupolas and furnaces and cranes and all that sort of thing would come in to supplement your guessing? Would not that be a necessary and valuable adjunct?

Mr. ELMER. It would be very valuable.

Senator TILLMAN. I suppose there are other steel plants in the country approximately as large as Carnegie's and that at Bethlehem.

Mr. ELMER. There are no armor-plate manufactories except at those places.

Senator TILLMAN. Those are the only two plants that have been especially equipped for this class of work?

Mr. ELMER. Yes, sir.

Senator TILLMAN. The question I am about to ask involves a pure guess, and you need not answer it if you do not want to. Have you any data, or could you give an idea or an estimate as to the additional expense—over and above what they were required to have in order to perform the work which they used to engage in before they made the Government contract—these people incurred in providing the extra large plant to handle the manufacture of armor?

Mr. ELMER. I do not know, sir.

Senator TILLMAN. You do not know; but can you not even give a guess? You guessed a little while ago that $250 a ton would be the ultimate cost of armor plate over and above the plant; and you felt safe in making that estimate, of course, or you would not have offered it. Now, can you give an estimate, in which you would feel safe, as to the extra cost to those people for what I have mentioned?

Mr. ELMER. I have heard it said that it cost them $4,000,000. I can not exactly see how, but then——

Senator TILLMAN. Do you believe it?

Mr. ELMER. No, I really do not; but then I do not know enough about it to express an opinion beyond what is the purest guess.

Senator TILLMAN. Not being engaged in that line of work and being there merely as an inspector, you may feel a delicacy in making such an estimate.

Mr. ELMER. I do not feel that such an estimate would be valuable.

Senator TILLMAN. You might miss it so far that those who are practically familiar with the expenses of such articles would feel some little disrespect for your judgment?

Mr. ELMER. Yes, sir.

Senator TILLMAN. Therefore I will not press the question at all.

Senator PERKINS. I understand the object of the committee in inquiring into this matter is to ascertain the practicability and the expediency of the Government erecting works for the manufacture of its own armor plate. It has suggested itself to me in this way. You state that armor can be manufactured for $250 per ton, in your opinion?

Mr. ELMER. That is the approximate cost.

Senator PERKINS. Yes. Is not that estimate based upon the fact that the Bethlehem works and the Carnegie works treat iron ore, make their own pig iron, make their own steel, and that the 60 per cent waste of the steel ingots can be used for rails and for fifty other purposes in the line of business in which they are engaged?

Mr. ELMER. They do not use the discard from the armor for steel *rails.*

Senator TILLMAN. They can not use nickel steel for steel rails.

Mr. ELMER. They only use it in melting up for armor plates.

Senator PERKINS. It is waste?

Mr. ELMER. No, sir; they keep on using it in making armor.

Senator PERKINS. The thought has suggested itself to me that your estimate, that we can make armor for $250 a ton, must be based upon the theory that the conditions will exist which apply as to those companies. Do you believe that if a plant belonging to the Government were established in Philadelphia, Baltimore, or Washington we could engage in this particular line alone and make armor plate for $250 a ton?

Senator CHANDLER. I suggest, Senator Perkins, that you modify the question so as to ask whether it could be done alongside of steel works.

Senator PERKINS. I will modify my question to that extent.

Mr. ELMER. The question which I answered was how much I thought it cost the Carnegies to make armor. For the Government to make it as cheaply as the Carnegies can make it would require the Government to work in the same way, to pay the same prices for labor, to work continuously, without extra price for overhours. With all those things included, I think the Government could make it for the same price.

Senator PERKINS. Did your estimate allow for any interest on the plant?

Mr. ELMER. None, whatever. My idea was simply the cost of material and labor.

Senator TILLMAN. Have you any idea of the proportionate cost of labor and material? For instance, if a ton of armor plate costs $250, how much of it is labor?

Mr. ELMER. I could not divide it without very considerable work and calculation.

Senator TILLMAN. Could you, by observation specifically in that direction when you return, by keeping a little memorandum, analyze the cost? Could you give us an estimate?

Mr. ELMER. I might make an approximate estimate in that way of the comparative cost of labor and materials. Of course I do not know exactly what the Carnegie people pay for their labor.

Senator TILLMAN. It would not be just to you to undertake to bind you down to any specific or exact estimate, but exercising your best judgment and the knowledge you have obtained by your residence there and observation, could you not particularize as to the cost? For instance, you can begin on a Monday morning, or some day when they start, and take an account of the coal and the materials as they go along, what the materials are worth when the work starts, the amount of labor applied until the plate is completed, the residue or surplus or waste, and all that, and then give us an estimate of it, which would be a much more correct idea than you have now yourself, even.

Mr. ELMER. I think I could make an approximate estimate.

Senator TILLMAN. That is what I am speaking of.

Mr. ELMER. I think I could give the approximate percentage. It would not be practicable for me, with my facilities for obtaining knowledge, to get anything like an accurate estimate.

Senator CHANDLER. About how large, ordinarily, is the test plate that you send to Indian Head?

Mr. ELMER. It depends upon the character of the group. For instance, if it is a group of the battle-ship barbettes, the plate perhaps would be 40-ton plate. If it is an 8-inch turret group, it would be one of those which would weigh perhaps 10 to 15 tons.

Senator CHANDLER. That represents about the average—from 15 to 40 tons?

Mr. ELMER. It is a representative plate of the group of armor.

Senator CHANDLER. A test plate is not supposed to go into a ship; it is not likely to go into a ship?

Mr. ELMER. No, sir; it can not go into a ship.

Senator CHANDLER. Is the expense of the test plate charged to the contractor or to the Government?

Mr. ELMER. If the plate passes successfully the Government pays for it, and if it fails the contractor loses it.

Senator TILLMAN. Does he lose the whole group?

Mr. ELMER. He has a second chance.

Senator CHANDLER. There is a question of a second chance, a retest. Can you tell me what is the commercial value of the large ingot which is taken to make the armor plate?

Mr. ELMER. I can tell you what simple steel is worth. Nickel steel is not on the market.

Senator CHANDLER. I understand.

Mr. ELMER. The nickel alloy contains 3¼ per cent of nickel. That alloy has no value commercially; that is, it is not marketable except for armor. Simple steel is worth about $17 a ton.

Senator CHANDLER. So, if we establish a Government armor factory conveniently to steel works, we could get simple steel for about $17 a ton?

Mr. ELMER. Yes, sir.

Senator CHANDLER. Can you give the committee an idea of what, under the same conditions, would be the cost of nickel steel ingots, without regard to paying royalties on patents or anything of that kind? How much per ton, in your judgment, would be added to the cost of the ingot?

Mr. ELMER. The absolutely correct information can be got from the Bureau of Ordnance, Senator. I should have to guess. It is about $60 a ton additional. Perhaps Mr. Rodgers can correct me.

Senator CHANDLER. If Mr. Rodgers can give the information, he may do so hereafter. Would you risk an opinion?

Mr. ELMER. No, sir; I would rather not, because the accurate information can be obtained. I can get it from my own office.

Senator CHANDLER. It would be the additional cost of the nickel which goes in, and that is all?

Mr. ELMER. That is all.

Senator CHANDLER. How much nickel goes in per ton?

Mr. ELMER. I can give you the record I have in my pocket of some of the casts for armor plate.

Senator CHANDLER. Can you tell me how much pure nickel goes into a ton of armor plate?

Mr. ELMER. I think about 106 pounds of nickel oxide goes into a ton of armor plate. I think that is it.

Senator CHANDLER. That is 5 per cent?

Mr. ELMER. About 3¼ per cent nickel.

Senator CHANDLER. Three and one-quarter per cent?

Mr. ELMER. Yes, sir; that is what we require in the finished plate.

Senator CHANDLER. And the nickel goes into the whole mass of the ingot?

Mr. ELMER. Yes, sir; it is melted in the heat.

Senator CHANDLER. The nickel goes into the whole mass, while the *harveyizing is of the* surface?

Mr. ELMER. It is a process like machining.

Senator CHANDLER. In order to utilize a plate which has been rejected at Indian Head, it would be necessary to send it back to the works?

Mr. ELMER. Yes, sir.

Senator CHANDLER. And cut it up?

Mr. ELMER. Yes, sir.

Senator CHANDLER. Is it an expensive process to plane or cut up a rejected plate in order to make scrap steel of it?

Mr. ELMER. No, sir.

Senator CHANDLER. It can not be done at Indian Head?

Mr. ELMER. No, sir; it has to be done by their big press.

Senator CHANDLER. Disregarding the question of freight and the question of the cost of cutting up the plate, the nickel in a rejected plate is worth just as much as the nickel which originally went into the plate?

Mr. ELMER. It is worth as much as that amount of nickel originally. If you want to look at one of these charges so as to see the character of the materials which go in, I will give it to you.

Senator CHANDLER. It would be well for you to give one of the charges.

Mr. ELMER. I have here a cast.

Senator PERKINS. It will be valuable information.

Mr. ELMER. It merely shows the elements that go into the heat.

Senator CHANDLER. Here is a big platform near the furnace, and around at different places are the various ingredients that make up the charge. Can you give one of those charges?

Mr. ELMER. This is the amount of material that went into the heat for one of the plates of the *Iowa's* barbette, and it will give you the proportion which they use. There were 85,000 pounds of pig iron; 176,500 pounds of nickel scrap (you see that is where the nickel scrap comes in, the discard); nickel oxide, 828 pounds—that is to make up for the deficiency in nickel which is not quite supplied by the nickel scrap; ferro-manganese, 2,935 pounds; ferro-silicon, 1,075 pounds; manganese ore, 3,855 pounds; coke, 450 pounds; limestone, 18,500 pounds. Those are the materials which went into the heat to make a plate which finally, in the end, weighed about 40 tons.

Senator TILLMAN. They go in first to make an ingot?

Mr. ELMER. Yes, sir; into the furnace.

Senator TILLMAN. And after the ingot comes out you shave off 60 per cent and take the residue, and that makes the 40-ton plate?

Mr. ELMER. Yes, sir.

Senator CHANDLER. The 176,500 pounds of nickel scrap is supposed to have in it 3⅛ per cent of pure nickel.

Mr. ELMER. Yes, sir.

Senator CHANDLER. Where did the 176,500 pounds come from? Had it been melted previously?

Mr. ELMER. It was discarded from other ingots.

Senator CHANDLER. A portion of the 60 per cent that is cut off?

Mr. ELMER. Yes, sir.

Senator CHANDLER. So that the process is carried on by melting over and over again the rejected pieces?

Mr. ELMER. Yes, sir.

Senator CHANDLER. Suppose that a Government armor-plate plant was located at any distance from steel works, would it be necessary to carry the nickel scrap back to the furnace in every case?

Mr. ELMER. Yes, sir.

Senator CHANDLER. So it would be very unprofitable for the Government to have armor-plate works except in close proximity to steel works?

Mr. ELMER. They should be in immediate proximity, for economy.

Senator CHANDLER. In order that this process of remelting can go on?

Mr. ELMER. Yes, sir. Your ingot should come directly to you from the flask.

Senator CHANDLER. Under heat?

Mr. ELMER. It can be heated afterwards. You have your heating furnace—annealing furnaces.

Senator TILLMAN. They take a hot ingot and proceed to manufacture the armor? They do not let it cool?

Mr. ELMER. They do not press it at the heat at which it comes, of course; it solidifies; but they take it under the press at a given temperature of several hundred degrees.

Senator TILLMAN. That is what I mean. Of course that process of working steel while it is still warm saves the expense of reheating. If the Government, for instance, were to take the shaved ingot after you have cut off the dross at the top, or that which is not of sufficient purity to be satisfactory, and it was cold, then the Government would have to warm the ingot in order to go to work to make the armor plate, and that would add to the cost?

Mr. ELMER. That is very commonly done. They put the ingot into what they call an annealing furnace, right by the press, and get it at the temperature they desire. Otherwise it would be difficult to get just the temperature that is wanted for shearing or pressing.

Senator TILLMAN. It is not essential that the ingot should be taken when it is hot? Frequently at Carnegie's they take an ingot when it is cold and then rewarm it.

Mr. ELMER. Yes, sir; it is not essential.

Senator TILLMAN. I would suggest that the committee ask you when you return, as throwing light on our work hereafter, to prepare and submit in writing an estimate such as I suggested a moment ago as to the proportionate cost of the labor, materials, etc., which would enter into the construction of such a plant.

Senator CHANDLER. I suggest that we defer doing that, and if we decide to ask for particular information of that sort we can communicate with Mr. Elmer hereafter. We can easily do that.

Senator TILLMAN. All right. I wanted to have Mr. Elmer make a statement about it.

Senator PERKINS. We will formulate it in a written communication, if we desire it.

STATEMENT OF LIEUT. COMMANDER JOHN A. RODGERS.

Senator CHANDLER. State your rank and present duty.

Mr. RODGERS. I am a lieutenant-commander, United States Navy, and am inspector of ordnance and steel at the Bethlehem Iron Works, South Bethlehem, Pa.

Senator CHANDLER. State, if you please, what Government work is now being done at South Bethlehem and the Government inspection force which is there employed.

Mr. RODGERS. The force consists of myself and a writer at present.

Senator CHANDLER. Is there no other naval officer?

Mr. RODGERS. Not at present. There was one but he has been detached.

Senator CHANDLER. What Government work is there done?

Mr. RODGERS. The Government work is the armor inspection and various items of gun work.

Senator CHANDLER. Generally what work are the Bethlehem people doing for the Government outside of the manufacture of armor plates?

Mr. RODGERS. They are making small-arm gun barrels.

Senator CHANDLER. For the Army and Navy?

Mr. RODGERS. For the Navy. They are making the forgings only.

Senator CHANDLER. The forgings for small guns?

Mr. RODGERS. For ten thousand new guns, caliber .236. They are making forgings for 3-inch, 4-inch, 5-inch, and 13-inch guns and castings for gun carriages.

Senator CHANDLER. Under contract with the Navy Department?

Mr. RODGERS. Yes, sir; except the small-arm gun barrels.

Senator CHANDLER. Are they doing any work for the Army?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Of what general character?

Mr. RODGERS. They are making 100 guns, of various calibers, I understand, for the Army, from 8 to 12 inch—8, 10, and 12 inch. I have also the inspection under the steel board.

Senator CHANDLER. You do the inspecting in both of those branches?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Are they making any structural steel for naval vessels?

Mr. RODGERS. They are making engine forgings.

Senator CHANDLER. For what vessels?

Mr. RODGERS. They are making them for three gunboats and three torpedo boats.

Senator CHANDLER. For what contractors?

Mr. RODGERS. For the Herreshoffs, for Moran, for Nixon, and also for the Union Iron Works at San Francisco.

Senator CHANDLER. You inspect all that work for the Government?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Before it is furnished to the contractor?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. You have heard the statement of Commander Elmer as to the methods employed for inspecting armor plate at the Carnegie works?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Are the same methods substantially pursued at Bethlehem?

Mr. RODGERS. Pretty much. We have no rolling mill there for rolling light-armor plates. They make all their armor under a press now.

Senator CHANDLER. They have at Bethlehem a large hammer and a hydraulic press?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. While at the Carnegie works they have only the press?

Mr. RODGERS. They roll some of their armor, I understand.

Senator CHANDLER. And they have a hydraulic press?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. To what extent in the making of the armor which the Bethlehem Company have furnished the United States has the hammer been used, and to what extent has the press been used?

Mr. RODGERS. I have never seen the hammer move since I have been there.

Senator CHANDLER. It was used only in the early part of the work?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. They do it all by hydraulic press?

Mr. RODGERS. Yes, sir. The hydraulic press is considerably beyond the capacity of the other part of the work, the carbonizing and machining.

Senator CHANDLER. There is no occasion to use the hammer?

Mr. RODGERS. There is no occasion, unless they mean to get out a larger amount of forgings than their tools will machine.

Senator CHANDLER. If you were to superintend in the erection of armor-plate works for the Government, should you want anything more than a press? Should you wish a hammer?

Mr. RODGERS. No, sir.

Senator CHANDLER. So that you consider works as complete which are supplied with a suitable hydraulic press?

Mr. RODGERS. I think it would probably be necessary to have a rolling mill for the lighter armor.

Senator CHANDLER. Would a hammer take the place of a rolling mill?

Mr. RODGERS. Oh, no, sir.

Senator CHANDLER. Do I understand that you would reject a hammer in either instance as needless?

Mr. RODGERS. Yes, sir. If there was any advantage in using the hammer, it has been lost since they have carbonized the plates.

Senator CHANDLER. Since they carbonize plates by the Harvey process, there is no need of the hammer?

Mr. RODGERS. No, sir. If there was any advantage in using a hammer, it has been taken away by the harveyizing process; that is, any advantage in the grain of the steel. There is some question about it.

Senator CHANDLER. And the proper method now, you think, is, after the harveyizing, to reforge under a hydraulic press?

Mr. RODGERS. You misunderstand me, Senator, I think. They do not reforge at Bethlehem.

Senator CHANDLER. Do they not reforge the armor plate?

Mr. RODGERS. They do not have what is called the double forging.

Senator CHANDLER. Is not reforging done under the Corey patents at the Bethlehem works?

Mr. RODGERS. No, sir.

Senator CHANDLER. The armor that is now being made at the Carnegie works is reforged under the Corey patent, is it not?

Mr. RODGERS. I have so understood.

Mr. ELMER. Yes, sir; it is.

Senator CHANDLER. That is not done at Bethlehem?

Mr. RODGERS. No, sir.

Senator CHANDLER. How near to completion is the present Bethlehem contract?

Mr. RODGERS. The contract for armor is practically complete, with the exception of the *Iowa's* turrets. They will be done probably in September.

Senator CHANDLER. How many tons remain to be completed?

Mr. RODGERS. I should say, roughly, 600 tons.

Senator CHANDLER. Are you aware of the fact that the specifications issued by the Department for armor plate for the two new ships, the *Kearsarge* and the *Kentucky*, require reforging after the harveyizing process?

Mr. RODGERS. No, sir; I am not aware of it.

Senator CHANDLER. You are not informed as to that matter?

Mr. RODGERS. No, sir.

Senator CHANDLER. If that were to be done, could it be done any better by a hammer than by a press, or by a press any better than by a hammer, the plate being reheated and again subjected to pressure?

Mr. RODGERS. I do not think there would be any advantage in doing it with a hammer.

Senator CHANDLER. Will you state whether or not the process of manufacture is, comparatively speaking, perfect now so far as defects in the armor are concerned as compared with the earlier work?

Mr. RODGERS. Yes, sir; it is.

Senator CHANDLER. Are there many spoiled plates?

Mr. RODGERS. Not if the plates are limited in size; but the tendency has been to increase the size of the plates, and therefore it keeps the art more in an experimental stage.

Senator CHANDLER. Can you give us any information about spoiled plates since you have been at Bethlehem? I refer to plates spoiled before they were delivered to the Government, so that they were not turned over to the Government.

Mr. RODGERS. When I went to Bethlehem there were a number of plates that were partially injured in the carbonizing furnace. They had to remachine them, and lost a good deal of time.

Senator CHANDLER. At what time did you go to Bethlehem?

Mr. RODGERS. I went there in March, a year ago.

Senator CHANDLER. How has it been since you have been there; have they lost any plates?

Mr. RODGERS. They have apparently overcome that defect in the Harvey process, but we have had another plate which was found to contain cavities. It was a very large plate for the *Iowa's* turrets.

Senator CHANDLER. Was it discarded?

Mr. RODGERS. It has not yet been discarded.

Senator CHANDLER. What is the expectation about it?

Mr. RODGERS. I do not know, sir.

Senator CHANDLER. What is the status of the plate so far as you are concerned?

Mr. RODGERS. It is rejected.

Senator CHANDLER. By you?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Has an appeal been made to the Department to accept it?

Mr. RODGERS. They wish to use it as a ballistic plate.

Senator CHANDLER. For test? How many tons does it weigh?

Mr. RODGERS. Roughly, 40 tons.

Senator CHANDLER. Believing it to be just as strong as if it did not have those defects, they propose it as a test for a certain lot of armor?

Mr. RODGERS. Yes, sir. They claim that it is a good plate ballistically; that this is an apparent defect.

Senator CHANDLER. Describe the apparent defect.

Mr. RODGERS. When the metal shrinks, it leaves a hole or pipe in the center. By putting a large head on the ingot this is carried up to the top. Commander Elmer told you that there was a large surplus of metal at the top. In this case the pipe seemed to drop down lower than usual and left a hole that I could run a wire into about 5½ inches.

Senator CHANDLER. At the top of the flask?

Mr. ELMER. *No, sir;* on the top end of the plate.

Senator CHANDLER. After the plate was made?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. That arose from the fact that this portion of the plate had been at the top of the furnance during the heating?

Mr. RODGERS. No, sir.

Senator CHANDLER. How did it arise?

Mr. RODGERS. It came in the wrong place, unexpectedly. They were very much surprised to find it there.

Senator CHANDLER. Was there only one of those holes in the whole plate?

Mr. RODGERS. Originally, I suppose it was only one hole, but it had flattened out into a series of holes which, my recollection is, were about a foot long.

Senator CHANDLER. Take this as the plate [exhibiting]. Was there only one of those defects on the face of the plate?

Mr. RODGERS. It was not on the face of the plate. It was on the end of the plate after it was sawed off—a cross section.

Senator CHANDLER. Suppose this table to be the plate. You mean that it was in the end here [indicating]?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. And not on the face of the plate at all?

Mr. RODGERS. No, sir.

Senator CHANDLER. Was there only one place where you found defects?

Mr. RODGERS. There was a series of small holes.

Senator CHANDLER. But in the same general locality?

Mr. RODGERS. It evidently had come from one big defect, but the plate, being spread out, elongated the defect.

Senator CHANDLER. We understand that. Nowhere else around the plate was there any defect?

Mr. RODGERS. No, sir.

Senator CHANDLER. You do not regard that as a serious defect in the plate?

Mr. RODGERS. No, sir.

Senator CHANDLER. For purposes of usefulness?

Mr. RODGERS. I do not believe it hurts it much.

Senator CHANDLER. Does it affect the surface of the plate at all, apparently?

Mr. RODGERS. It does not affect the surface.

Senator CHANDLER. It is not visible on the plate?

Mr. RODGERS. The same plate was somewhat injured in carbonizing.

Senator CHANDLER. On the face?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Describe that defect.

Mr. RODGERS. There was a series of small pits where the metal in melting had run away from the face of the plate.

Senator CHANDLER. What portion of the plate was affected in that way; what percentage of the surface?

Mr. RODGERS. I suppose half of the plate was sort of smallpoxed.

Senator CHANDLER. And that, the Bethlehem people contend, indicates no weakness in the plate?

Mr. RODGERS. Yes, sir; I think it amounts to very little.

Senator CHANDLER. This plate, at a cost of $500 a ton—a 40-ton plate, was it?

Mr. RODGERS. Yes, sir.

Senator PERKINS. That would be $20,000?

Mr. RODGERS. It is at the rate of $575 a ton, being a turret plate, to which should be added the cost of the Harvey process. The rule is to select the worst plate of the group.

Senator CHANDLER. For a test?

Mr. ELMER. Yes, sir; for a test. This being an imperfect plate, I believe the Department had authority to reduce the price of it.

Senator CHANDLER. In round numbers, the value of that plate is about $25,000?

Mr. RODGERS. I should put it in that neighborhood.

Senator CHANDLER. And the Bethlehem Company are so confident of its strength that they propose it for a test plate?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. Knowing that the test is to determine whether that group of plates is to be selected?

Mr. RODGERS. Yes, sir.

Senator CHANDLER. What is the size of the surface of that plate; how long and how wide do you think it is?

Mr. RODGERS. I think that plate is about 17½ feet long.

Senator CHANDLER. And about what is its width?

Mr. RODGERS. I have forgotten the width, but I think it is something like 9 feet.

Senator CHANDLER. In the vicinity of 9 by 17, and worth $25,000?

Mr. RODGERS. Yes, sir.

Senator SMITH. How long have you been at the Bethlehem Iron Works?

Mr. RODGERS. I went there last March. I have been there about a year.

Senator SMITH. Have you ever made an approximate estimate of what armor plate can be produced for?

Mr. RODGERS. I never made what you would call an estimate. I have made an attempt at it, but nothing in which I have felt any confidence.

Senator SMITH. What, in your opinion, from the facts you have gathered, does it cost the Bethlehem people to manufacture armor plates?

Mr. RODGERS. I never arrived at any sufficiently satisfactory conclusion in my own mind to make a statement about it.

Senator SMITH. Have you not some opinion as to the probable cost?

Mr. RODGERS. My opinion is not sufficiently well established in my own mind to fix the cost at any figure.

Senator SMITH. Not even to approximate it?

Mr. RODGERS. No, sir; there are so many things which enter into the consideration that there is nothing I would be willing to stand by in making a statement to that effect.

Senator SMITH. Give us the benefit of your judgment and your best opinion now as to what the cost is.

Mr. RODGERS. I could not set a figure that would be of any value. I do not think it would be of any value.

Senator SMITH. You have given it some consideration?

Mr. RODGERS. Yes, sir; some consideration. But in making such a statement I would have to have some value attached to it in my own mind before making an estimate.

Senator TILLMAN. You would not be willing to give a maximum estimate; in other words, giving yourself a large margin of safety?

Mr. RODGERS. I could give a maximum estimate, but it would be so large that I do not think it would be of any value. There is a very

great difference in the cost of each article. There is a difference contract price, and there is a difference in the cost.

Senator SMITH. What do you mean by that statement? Expl what you mean.

Mr. RODGERS. I mean as to each variety. For instance, what they call a hollow armor forging—a conning tower, whic one piece—is very different from making an armor plate. Then the difference in size makes a very great difference in the cost. I assume that where they were not making many plates of the sa it would make a difference.

Senator TILLMAN. Would a 40-ton plate cost more than a plate, relatively, per ton?

Mr. RODGERS. I think it would. I think they would rathe about 20-ton plates, probably.

Senator SMITH. You are not prepared, then, to give any appr idea or opinion as to the cost of armor plates?

Mr. RODGERS. No, sir; I do not think I could. I could not estimate that would be of any value.

Senator SMITH. Can you now furnish the committee with any which would give an approximate estimate of the cost of the e of a plant for the manufacture of armor plate?

Mr. RODGERS. No, sir; I can not, except what I have heard cost of the plant, which is merely hearsay.

Senator SMITH. What did you hear about it?

Mr. RODGERS. I have heard it stated at $3,500,000, and the at nearly $4,000,000. That is including the plant and includin it cost them to get information. I understand from general ta they paid a great deal to Creuzsot and Whitworth. That woul to come out of the estimate of nearly $4,000,000.

Senator SMITH. You neither know the approximate cost of pr armor plate, nor do you know the cost of armor-plate works they have now?

Mr. RODGERS. No, sir; I do not know the cost of the works.

Senator BACON. You were speaking of your inability to make mate as to the cost of armor plate. You know the cost (approxi speaking always, of course) of the steel before it is combined w nickel?

Mr. RODGERS. I do not.

Senator BACON. You do not?

Mr. RODGERS. No, sir; because I am not in that. That is manufacturing center at all. I do not see any of it.

Senator BACON. Could you tell, approximately, whether th would cost $17 a ton, or whether it would cost $50 a ton?

Mr. RODGERS. Yes.

Senator BACON. Very well. I want to see if I can not assist coming to some reasonable approximation of the cost of armor. do you say, approximately, is the commercial value of the steel is used?

Mr. RODGERS. Do you mean the charge of the furnace?

Senator BACON. The steel that Commander Elmer testifies is $17 a ton. Is his estimate correct?

Mr. ELMER. That is plain steel.

Senator BACON. Plain steel.

Mr. RODGERS. I understood that that was commercial steel.

Senator BACON. Yes, sir; that is what I am talking about: th steel he testifies as being worth $17 a ton—the plain steel. *about* a correct estimate?

Mr. RODGERS. I expect it is, because he——

Senator BACON. Very well. Now, I am asking you to state approximately, not accurately, what does it cost approximately per ton to combine with that the 3½ per cent of nickel?

Mr. RODGERS. Do I understand you to mean to make another ingot?

Senator BACON. I understand that these various materials are taken and combined. You make the nickel alloy, do you not, by combining the nickel and steel?

Mr. RODGERS. The way they do there is the same as Commander Elmer stated. There is so much scrap and so much of what they call wash metal that goes into the charge. The scrap they have from the——

Senator BACON. Now, Lieutenant-Commander, will you kindly answer the question I asked without going in another direction? Take it as an original process where there is no scrap.

Mr. RODGERS. Still, I do not understand the question, sir.

Senator BACON. Well.

Mr. RODGERS. As I understand it, the ordinary open-hearth steel costs $17 a ton; that is after it is melted.

Senator BACON. Very well, sir.

Mr. RODGERS. The ingot steel——

Senator BACON. Then what is next put into it?

Mr. RODGERS. There is not anything put into that.

Senator BACON. What I want to know is this: The material out of which the armor plate is finally fashioned is made up of certain ingredients?

Mr. RODGERS. Yes, sir.

Senator BACON. You know what each one of those ingredients is, do you not?

Mr. RODGERS. Well, yes, sir; in a general way.

Senator BACON. The basis of them all is the plain steel. Then, take the next ingredient; select it at your pleasure; what is it?

Mr. RODGERS. I suppose you mean nickel, then, from what you say.

Senator BACON. You know the various ingredients. I am merely asking you to take up each one of the ingredients and state what it costs. I am trying to see if I can not assist you in forming an approximate idea of the cost of one of the plates. If you know the ingredients you can select them in the order you prefer in telling the committee as to each one. Plain steel is the first. Now, select the next one at pleasure.

Mr. RODGERS. The scrap is the first that goes into the open hearth.

Senator BACON. I do not want any scrap in this at all. I want it just as the original process stands, because the scrap has other ingredients in it.

Mr. RODGERS. I do not understand you, sir.

Senator BACON. Very well; I will not press it.

Senator SMITH. The steel costs $17 a ton, approximately. What does it cost to nickel that steel?

Mr. RODGERS. It does not cost the company anything, as I understand it. The nickel is supplied by the Government to the works, and is put in by the company, and it does not cost them anything. Practically they just throw it in the furnace.

Senator SMITH. Will you tell us, then, approximately? The cost is $250 a ton to manufacture it. What makes up the difference between $17 a ton and $250 a ton?

Mr. RODGERS. In making the armor?

Senator SMITH. Yes, sir.

Mr. RODGERS. Well, in making the ingot for the armor it is enti different from the commercial way of making a small ingot. I much more it costs to make that ingot I do not know; but it c something more, I presume. Then the armor has to go to the fo It is forged. It will take two days to forge a good-sized plate, perh three days, varying a good deal in the way the plate works; but, erally speaking, a large plate will take two days. The plate is t annealed. It is then partially machined, carbonized, bent, finis machined, water hardened, rectified, bolt holes made, fitted, and set so that by the time the ingot is manufactured there is a very consider expense.

Senator SMITH. What would you think that expense would be?

Mr. RODGERS. The expense of which process, sir?

Senator SMITH. After the ingot is made up to the time it is read be Harveyized.

Mr. RODGERS. I understand you to mean until ready to be ship

Senator SMITH. Yes, sir; of all characters.

Mr. RODGERS. It would vary from $100 to $200 a ton, I should th

Senator SMITH. Would $150 a ton be about an average?

Mr. RODGERS. It might be, but I could not say definitely, beca as I said, it will vary. I can give you an instance, if you would lik hear it. I have seen very few of these plates manufactured from commencement to the end. In the case of the *Puritan's* conning to however, they sent it to the forging shop June 6 and they cold-chi it to July 24. Then they commenced to heat it.

Mr. PERKINS. They put it in the annealing furnace?

Mr. RODGERS. Yes, sir; the heating furnace. They hot-chipped i 35 heats and forged for 6 heats. They ended the forging August They commenced July 24 and finished August 17. If it had been a s ingot or under favorable circumstances they might have done the w thing in a week.

Senator SMITH. That is a very exceptional case, is it not?

Mr. RODGERS. Very, sir. Besides that, when I went there in M there was an ingot in the lathe being bored, and it was rejected. T they cast this other ingot and got it ready to send to the forge Ju They were in a great hurry for it and they got it off, I think, earl January. Yes, sir; that is exceptional, and that is the reason w think it is very difficult, unless you have books, to make a statement.

Senator SMITH. Of course, exceptional things happen in every m facturing business. At the same time the manufacturer must be ab get a general average as to the cost of any article that he produce

Mr. RODGERS. Of course, they must have the books?

Senator SMITH. Of course. I supposed that you being there on ground and looking at the different processes could form some ide the probable cost of manufacture, and come perhaps within 10 per of the cost.

Mr. RODGERS. I could not come anywhere near 10 per cent of it

Senator SMITH. Could you come within 20 per cent?

Mr. RODGERS. I am very uncertain about that, because I have guide to go by at all. I do not know the cost of the coal, and t are no other people around there to ask about it.

Senator PERKINS. I understand that Lieutenant Commander Rod

has stated that it is his specific duty to ascertain the physical and chemical properties of the plates and that is all that he knows and does for the Government. Is not that the case? As to the cost of manufacture you know nothing except by hearsay?

Mr. RODGERS. I have no knowledge about the cost of manufacture of the armor, hearsay or otherwise, except from estimates I have made of the cost of labor and material. These estimates were made from a slight amount of information received from sources outside of the Bethlehem Iron Company's Works, from the records of my office, from personal observation, and guess work. The estimates probably lack accuracy in nearly every essential feature, and I am unable to make up my mind as to the probable error; but assuming that my estimates are correct, I am of the opinion that the average cost of labor and material will not be more than $250 per ton of armor.

My duty is to see that the material is made according to contract and specifications. The obligation is upon the company to satisfy the inspector of the correctness of everything, and its accordance with the terms of the contract; but this does not include the question of cost.

Senator PERKINS. All you need to know is the condition and the results?

Mr. RODGERS. Yes, sir; at the same time, I did endeavor to ascertain the price.

Senator PERKINS. But you look upon it as your specific line of duty to have the plates come up to the standard fixed by the Government?

Mr. RODGERS. Yes, sir.

Senator SMITH. I appreciate all of that, and I also appreciate the fact that we sometimes have very inquiring minds.

Senator PERKINS. If the Lieutenant-Commander has ascertained it he does not want to tell us. That is very evident.

Senator SMITH. The Lieutenant-Commander has been there only a short time; they are large works, and it takes some time to familiarize one's self with them.

Mr. RODGERS. If I knew, of course I would tell you; but I would not like to make a specific statement, because, as I said, I did make an attempt, and tried it in different ways, and the figures came out differently.

Senator PERKINS. You did not state the weight of the *Puritan* conning tower.

Mr. RODGERS. Thirty-six and eight-tenths tons.

Senator PERKINS. One-third the circumference of the tower, the plate reaching one-third around?

Mr. RODGERS. The forging is what is called hollow-armored forging. There is no butt in it. It is just made from an ingot that is bored out and then enlarged on a mandrel.

Senator BACON. I wish to ask one question, to see if I understand you correctly. The Government, you say, furnishes the nickel?

Mr. RODGERS. Yes, sir; the Government furnishes the nickel.

Senator BACON. And no credit is made on the $500 per ton for the cost of the nickel? I will put the question in another way, if you do not understand it. The Government has been paying $500 a ton for armor plate?

Mr. RODGERS. It pays more than that.

Senator BACON. It did pay $500 per ton, say. That is not credited with the cost of the nickel that enters into it and which was paid for by the Government?

Mr. RODGERS. I think not, sir.

Senator BACON. In other words, the cost of the nickel is additional?

Mr. RODGERS. I do not know; that does not come under my supervision, but I understand that Congress appropriated a certain sum, I think $2,000,000, for nickel.

Senator SMITH. For the purchase of nickel?

Mr. RODGERS. For the purchase of nickel; and that is not quite all used up yet.

Senator PERKINS. I will ask Commander Elmer if he does not understand that that is charged to the contractors?

Mr. ELMER. No, sir; it is supplied.

Mr. RODGERS. It is supplied to the works, and they put it in.

Senator PERKINS. It is an additional cost, then, to the contract price?

Mr. RODGERS. It makes an addition to the cost. I understand that the average cost is about $617 a ton.

Senator BACON. Where did you get the idea that it cost $617 a ton?

Mr. RODGERS. I got it from the Bureau. I did not make it up myself.

Senator BACON. Do you mean that you got it as definite information or just as an understanding on your part?

Mr. RODGERS. I understood that they had figured it up.

Senator BACON. And that was the cost, including the cost of the nickel?

Mr. RODGERS. That was what they considered to be the cost, including the cost of the nickel. That is the way I understood it. Harveyizing is a separate item, too.

Senator BACON. I understood that the harveyizing process was performed by the Carnegie works and the Bethlehem works, and that the cost of that process was included in the $500 a ton paid to them. Do you mean to say that the Government pays extra for that?

Mr. ELMER. The Government pays from 2¼ cents to 4¼ cents a pound for all plates harveyized.

Senator BACON. In addition to the $500 per ton?

Mr. ELMER. It is not $500. It is not a fixed sum. It varies according to the thickness of the plates. It pays in addition to the contract price 2¼ cents for anything thicker than 8 inches, and 4¼ cents for less than 8 inches. That is specified in the contract. If you have a copy of the contract it will show.

The committee, after spending some time in secret session, adjourned.

AMOUNTS PAID FOR ARMOR.

The following letter from the Secretary of the Navy was made a part of the record:

NAVY DEPARTMENT, *Washington, March 23, 1896.*

SIR: In reply to your letter of the 16th instant, requesting to be furnished with a statement of the amounts thus far paid to the Carnegie Steel Company and to the Bethlehem Iron Company for armor, with estimates of the balance which may have to be paid to fulfill existing contracts, I have the honor to report that the following are the

amounts that have been paid the companies named during the period covered by your inquiry, viz:

Date.	Bethlehem Iron Company.	Carnegie Steel Company.
1895.		
June 30	$4,734,390.24	$4,144,475.03
July 8	35,905.64	
July 11		17,047.61
July 11		1,680.75
July 13	6,326.21	
July 13	52,716.26	
July 13	5,060.76	
July 13	17,104.73	
July 15		10,868.20
July 26	71,862.25	
July 26	6,192.21	
July 30		2,757.48
July 30		35,106.46
July 30		3,430.03
August 6	10,901.07	
August 6	12,491.15	
August 6	1,094.88	
August 16		17,553.74
August 16		1,671.75
August 16		18,324.55
August 16		1,671.75
August 16		34,966.85
August 16		3,410.82
August 19		5,152.39
September 3	42,827.85	
September 3	4,151.01	
September 9	15,736.50	3,437.60
September 9	1,525.23	450.76
September 9	17 152.43	9,071.20
September 9	1,184.62	9,053.58
September 10		5,690.32
September 10		851.34
September 19		262,405.14
September 18		9,564.08
September 24	15,754.05	
September 24	1,526.93	
September 27		16,115.96
October 4		12,214.79
October 4		1,180.57
October 5	72,019.35	
October 5	6,980.34	
October 5	1,123.50	
October 8	32,640.91	
October 8	3,133.53	
October 15	3,570.07	
October 18	324.62	
October 18	51.43	
October 30	3,468.46	
November 16	2,030.67	
November 21	22,715.33	
November 6	24,392.82	
November 6	2,341.71	
November 19	1,287.75	
November 21	14,428.90	
November 19	85,081.63	
November 19	7,293.32	
November 27	9,019.46	
December 3	11,732.96	
December 3		180.72
1895.		
December 3		$8,998.15
December 13	$72,795.62	
December 13	6,206.95	
December 18	10,265.78	
December 30	1,748.74	
1896.		
January 4	21,764.45	
January 4	12,381.19	
January 4	1,085.24	
January 4	7,290.97	
January 11	19,435.14	
January 11	1,943.84	
January 11	7,328.07	
January 11	2,424.89	
January 15	26,687.29	
January 18	53,710.03	
January 18	4,707.80	
January 18	7,263.97	
January 18	13,914.28	
January 18	1,219.62	
January 20	1,483.68	
January 20	15,324.47	
January 20	1,343.22	
January 20	22,407.22	
January 28	15,835.95	
January 28	1,534.87	
February 6	7,315.54	
February 11	1,097.93	
February 11	19,445.95	
February 11	17,105.40	
February 11	1,657.91	
February 15	24,867.20	9,934.90
February 17		1,891.76
February 28	749.98	
February 28	71,284.47	
February 28	6,161.02	
March 2	599.10	
March 2	81.22	
March 2	12,290.62	
March 2	1,077.30	
March 3		667.53
March 3		331.42
March 3		5,831.32
March 3		809.55
March 4		64,027.19
March 4		5,914.60
March 9	2,344.29	
March 9	3,383.56	
March 13		13,433.40
March 13		1,141.70
March 13		189,938.68
March 13		16,648.54
March 13		114,184.99
March 13		10,008.56
March 17		328.28
Total	5,857,105.55	5,072,424.04

The following amounts are still to be paid, viz:

For—	Bethlehem Iron Company.	Carnegie Steel Company.
12-inch turrets, Iowa	$308,505.58	
8-inch turrets, Iowa		$26,989.40
Side plates, Iowa		30,931.60
Casemate plates, Iowa		12,616.00
Ammunition tube, Brooklyn	11,400.00	
Amounts still to be paid on account of reservations under the several contracts	246,145.14	210,553.25
Total	566,050.72	281,090.25

The differences between the statement herein made of the amounts still to be paid to fulfill existing contracts and the statement previously furnished and quoted in your letter (after making allowances for payments made during the period between the dates of the two statements) is due to a necessary revision of the weights of armor embraced in the schedule printed on page 14 of the Report of the Bureau of Ordnance for the year 1895, and to the omission in the first instance of the reservations which had accumulated under the contracts of 1893 with these two companies.

Neither the statement of the amounts thus far paid nor the statement of the amounts still to be paid includes anything on account of the fund of 2 cents per pound, provided for in the fourth clause of the contract of November 20, 1890, with the Carnegie Steel Company for contesting the so-called nickel-steel patents. The Department explained the status of this matter in its communication of January 23, 1896, addressed to the chairman of the Committee on Naval Affairs of the Senate. No payments have been made, nor does the Department at present anticipate making any under the provisions of the fourth clause of the contract in question. One voucher covering a portion of the amount involved was submitted to the accounting officers of the Treasury Department for settlement and was disallowed by the Comptroller.

Very respectfully,

H. A. HERBERT, *Secretary.*

Hon. W. E. CHANDLER,
United States Senate, Washington, D. C.

TUESDAY, *April 7, 1896.*

The committee met at 11 a. m., with Senator Hale as acting chairman.

William M. Folger, commander, United States Navy, appeared.

Senator HALE (acting chairman). Last Saturday was set as the day when Commander Folger should be heard, who desires to give his testimony on the subject of the resolution under which the investigation is proceeding, and we were going on with the hearing when I received a dispatch from Mr. Chandler stating that he could not be here on Saturday, and he wished to be present, of course, at the hearing, upon which the chairman made an arrangement that Commander Folger should come here to-day, and we would give the day to him. You are ready, Commander, to go on with your testimony?

STATEMENT OF COMMANDER WILLIAM M. FOLGER.

Mr. FOLGER. I saw the chairman, Senator Cameron, the other day and asked permission to read, in the first place, a statement which contains in a form as condensed as I could put it the narrative of my connection with the harveyed plate development. If you please, I should like to read that statement. It is not very long.

Senator HALE. Very well. Does that paper state your present relation to the Department?

Mr. FOLGER. My present relation.

Senator HALE. You are at present on waiting orders?

Mr. FOLGER. I am on "waiting orders."

Senator HALE. At what time were you Chief of the Bureau of *Ordnance?*

Mr. FOLGER. From February, 1890, until January 1, 1893.

Senator HALE. Under Secretary Tracy?

Mr. FOLGER. Under Secretary Tracy the whole time.

Senator HALE. With this preliminary, you can go on and read your statement, and the examination will be taken up by members of the committee afterwards.

Mr. FOLGER. I beg to submit the following statement in regard to my connection with the development of the "Harvey armor plate:"

Ex-Secretary Tracy will tell you, if he is asked the question, that I described to him as a possibility and as an ideal armor—if it could be produced, although I did not know then how to do it—what is now known as the "harveyized plate." This was some time—perhaps a year—before the appearance of Mr. Harvey in Washington with his process.

Thus when, in the early part of 1889, Mr. Harvey presented himself to me at the Washington Navy-Yard with some specimens of tool steel, in which, as shown in a new fracture, carbon had apparently penetrated to a greater depth than is usual in the cementation process, I was interested at once, and asked, "Can you, in this manner, drive carbon into a larger mass of steel?" He replied he could do so, and I asked him to bring me a 3-inch cube of steel that had been treated by his process. He brought me a larger mass—perhaps a fragment 4 inches thick—and I then obtained from the Bureau of Ordnance (Captain Sicard was then Chief of Bureau) permission to have a small plate made some 3 feet square and 4 inches in thickness, which was sent to Mr. Harvey's establishment in Newark, N. J., and treated.

This small plate was tested ballistically by firing a 6-pounder projectile against it with sufficient force to nearly perforate a similar plate of steel which had not been treated. The projectile broke up on the face of the plate, making scarcely any penetration—perhaps one-eighth of an inch—leaving the plate quite unharmed. I felt that a new feature in armor had been reached, and reported the facts to the Bureau of Ordnance. It was quite close to the end of the tour of duty of the then incumbent in the Bureau of Ordnance, and the matter was allowed to drop until I became Chief of the Bureau in February, 1890, when I immediately took steps to thoroughly test the process. As there were no means of obtaining a plate of sufficient size in the United States at this time, an order was given to the agent of the Creusôt works in France for a target plate 6 feet by 8 feet by 10½ inches, which in due time (several months were required) arrived in this country. In the meantime a small furnace for treating—supercarbonizing—this plate was erected in the Washington Navy-Yard. This furnace was erected under the supervision of Mr. Harvey, and the Creusôt plate was supercarburized on one face under the direction of Mr. Harvey and subsequently chilled under his direction, and these operations resulted in the production of a plate of very remarkable properties, as fully appears in the official reports of the time.

It is probable at this time also, for I do not recollect the date, and it may have been after the plate was tested, that I recommended to Secretary Tracy that the Department request the Department of the Interior to give precedence to the consideration by the examiners of the Harvey patent upon a supercarbonized face hardened armor plate. Since in case the claim of invulnerability in the plate became justified by proper ballistic tests the Government would probably make some arrangement with the inventor, I based my recommendation to the Secretary upon the expediency of having the soundness of the

patent decided as soon as practicable. I will call the attention of the committee to the fact in the history of the plate patent that it was not allowed at first and was sent up on appeal to a superior board of examiners. This is noted as evidence that the request by the Department that the patent be "expedited" was at least not effective in securing its issue. I am informed since my recent return from sea, by Mr. E. E. Quimby, the patent agent of the Harvey Steel Company, in New York, that the issue was, in fact, not expedited. He at first said that no request for giving precedence had been made, but upon inquiry in Washington he learned that Mr. Harvey had obtained and utilized such a request from the Navy Department without his (Quimby's) knowledge. I do not think that the request from the head of a Department that the consideration of a patent claim be given precedence entails in the slightest degree the idea that the official making the request desires a favorable consideration. Such an idea never occurred to Secretary Tracy or myself in the case of the Harvey plate patent. (It will be understood, of course, that the process was already patented before Mr. Harvey came to me at the Washington Navy-Yard.)

If the subject of the expediting of the patent is not entirely clear to the committee, I request that Mr. E. E. Quimby (No. 59 Liberty street, New York) may be called as a witness.

After the successful test of the Schneider (Creusôt) plate, the first contract was made with the Harvey Steel Company, by which the Government agreed to bear the expense of the experimental development of the plate, the company accepting as royalty the sum of one-half of 1 cent per pound of the finished plate until the sum of $75,000 was reached, specifying the armor of vessels then authorized by Congress; after which, for the armor of later vessels, a new contract was to be made. The Harvey Company undoubtedly hoped at this time—a fact which I recollect with great distinctness—that they would receive a larger price per pound in the second contract for later vessels, as the Government would then have completed the experimental development of the plate, and thus be at no such expense. No such promise was, however, made to the company.

It is to be noted here that—barring the cost of the experimental plates and recollecting that similar experimental plates would have had to be tested by firing against them, had we taken any other system or method of armor manufacture than that of the harveyed plate—the cost to the Government of developing the plate did not exceed $10,000 over and above what would have been the cost to the Government of experimenting with other plates. I speak from memory only, and the figures may be less than that amount, but not greater. I refer to the development, the building of a furnace, and special experimentation at the Washington yard.

The first contract was the only one with the Harvey Company with which I had to do as chief of the naval Bureau of Ordnance.

THE SECOND CONTRACT.

The second contract is dated March, 1893, about three months after I left the Department and while I was on leave of absence. I had nothing to do with its inception or preparation beyond a limited discussion with the officials of the Navy Department while acting as a representative of the Harvey Steel Company. (The idea of abrogating the old contract and making a new one was, I think, suggested by the law *officers of the* Navy Department.)

In spite of the expectation of the Harvey Steel Company that a larger price would be paid by the second contract, the same figures were inserted—one-half of 1 cent per pound.

The contract was completed in Secretary Herbert's time, as the committee is doubtless aware.

EMPLOYMENT BY THE HARVEY STEEL COMPANY.

The Harvey Steel Company, as such, made but one offer to me to leave the Department and enter their employ as a technical expert. This was under the following circumstances:

On an occasion of my being in New York—as nearly as I can remember, some eighteen months before I left the Department—I was asked to meet the board of directors at their office. I went down town and the then president of the company, a Mr. Benjamin Clarke, asked me if I would consider a proposition to leave the Department and enter their employ.

I replied that I could not do such a thing at that time, as I had a great mass of unfinished work on hand, and that I could not even discuss the matter with them. If for any reason I left the Department (and I was several times near resigning my position, the task given me of building up all our manufacturing resources for naval war material being a very difficult one), I would then consider such a proposition from them. There was no mention of terms or of services rendered or to be rendered. The board thanked me for coming to see them, and I left the office, the interview having lasted perhaps fifteen minutes. (Mr. S. S. Palmer, at present president of the Harvey Steel Company, whom I have requested may be called as a witness, will corroborate this statement.) I saw Mr. Harvey frequently in Washington, as was to be expected, since measures to be taken in the experimental development of the plate were agreed upon after discussion with him. No person outside the Department, and the officials of the Bethlehem Iron Company in the later stages, ever assisted or was present during these discussions.

Mr. Harvey never made me any proposition or offer of any description of shares or other remuneration in contemplation of my joining them prior to my leaving the Department on January 1, 1893, nor did any other person in or out of the Harvey Steel Company ever make me any offer of terms of any description or amount, either shares or money, before the date of my leaving the Department. Mr. Harvey was not in a position, financially, to make such an offer, being entirely dependent upon the wealthier members of his company, resident in New York, in all company matters. He might have offered me some of his shares, it is true, but he did not do so, and no question or discussion of what remuneration I should receive in the event of my leaving the Department ever arose between us, or between myself and any other member of the Harvey Steel Company.

I make this explicit statement, as in an interview with a member of the committee prior to the introduction of the Senate resolution calling for this investigation the member referred to said I might be accused of having made such prior arrangement. Such accusations have likewise been intimated in the press and in the Davies trial.

The next proposition which I received from the Harvey Steel Company is contained in the letter from Mr. Harvey, now deceased, as follows (the original letter is at the service of the committee), dated, it will be observed, some weeks after I had resigned my position as Chief

of Bureau and after acceptance of my resignation had been published in perhaps half the newspapers in the country:

HARVEY STEEL COMPANY,
No. 52 Wall street, New York, December 28, 1892.

Commander WM. M. FOLGER.

MY DEAR SIR: I am instructed by the board of directors of this company to invite you to accept the office of consulting engineer to our company on ordnance and armor plate, and such other matters as may come under our patents, whenever you are at liberty to so act.

We shall be happy to meet you then and arrange the terms with you.

Yours, very truly,

H. A. HARVEY,
President of the Harvey Steel Company.

Senator HALE. Was that letter written in 1892?

Mr. FOLGER. December 28, 1892.

Senator CHANDLER. Three days before he left the Department.

Mr. FOLGER. This was after my resignation had been published far and wide and accepted, and I had received a letter from President Harrison in regard to my leaving. About the 8th of January, 1893, three members of the Harvey Steel Company and myself met in the Arlington Hotel, in Washington—I then being on leave of absence—and the formal offer was made to me to enter the employ of the Harvey Company as consulting engineer. Mr. S. S. Palmer will testify as to this. Later, I think in March, I was made general manager, and assumed executive charge of all the technical affairs of the company. The remuneration offered me was a salary of $5,000 per annum and 200 shares of stock. I received the shares in the following June. The shares were offered me as coming from the company, and were not given me by Mr. Harvey, as stated by Mr. Allen Smith in his testimony in the Davies case. Until seeing this testimony I did not know, and do not know now, that these shares may have been contributed to the company by Mr. Harvey.

At the time they were offered me and at the time I left the employ of the company in June (not November) they had no selling value. They could not have brought any price at auction. Mr. Smith, who says in the Davies case their value was par, did not enter the employ of the company until some two months after my own entry, and he did not know their value. I refer to Mr. Smith's testimony in the Davies case. These shares did not really attain any selling value until after the Harvey plate was generally adopted in Europe, or perhaps two years subsequent to the date of my receiving them. At the time I entered the employ of this corporation it was $100,000 in debt, and immediately afterwards some of its moneyed men had to furnish funds to pay my salary and continue operations. I was fully aware of this fact at the time. In April, at my instance, all work in the shop in Newark was suspended to avoid expense until the result of the European tests and business operations would warrant a further outlay.

On June 1 money was scarce and I informed the company I intended to resign as consulting engineer and go to Europe, in order to consult a physician at Gastein, in Austria, a specialist for diseases consequent upon overwork. At this date the company was in a controversy with its European agent, and after a full discussion of the subject I was empowered to settle the matter with the European agent, and sailed, being paid my last month's salary in June (not November, as stated by Mr. Smith in his testimony in the Davies case).

I did not go to Europe to arrange contracts with foreign Governments, as stated in the Senate resolution. I had absolutely nothing to

do but to arrange the matter in controversy referred to. I did not see any foreign parties or persons or others besides the agent mentioned while in Europe, and I remained with him but ten days in London, two days in Paris, and then went to Austria. I sent one cable message to the company from London, arranging the subject in controversy, and this I supplemented by the usual written report. No Harvey business whatever was transacted by me in Paris. I willstate that my suggestions from London as to a settlement with the European agent are considered to have been of great value to the company and to have smoothed the way to the subsequent successful conclusion which has been reached. (The whole of this will be substantiated by Mr. S. S. Palmer, whom I have requested may be called as a witness.)

In October of 1893—the same year—I returned from Europe and applied to the Navy Department for service at sea, which in January, 1894, was approved in my orders to the Bering Sea fleet.

Upon my return in December last I was met by the news of the publication in a New York paper of the attack upon my reputation as a development of the Davies case. I came to Washington and personally asked the Secretary of the Navy for an investigation of the matter. He informed me that such action was not called for, and intimated that in his opinion the newspaper attack was unworthy of notice. I then considered it proper in me to call upon a member of the House of Representatives and one of the Senate, to inform them that I had done all I could at this time to rehabilitate my character. I purposely selected gentlemen who had been friendly to me in the past and whom I felt would be interested in my affairs. The member of the House expressed a cordial sympathy. The member of the Senate informed me that he intended to introduce the resolution under which this investigation is being made. To this I replied that I believed the armor-contracts feature would develop nothing but credit for Secretary Tracy's administration, and as for myself I was quite prepared to be questioned.

THE DAVIES CASE.

Soon after my return from Europe, in October, 1893, while in Boston, I received the following letter from the Harvey Steel Company:

THE HARVEY STEEL COMPANY,
New York, October 6, 1893.

Commander WM. M. FOLGER,
Algonquin Club, Boston.

MY DEAR SIR: Mr. James R. Davies has put in a claim against this company for services in securing the adoption of the Harvey process by the United States Navy Department. He stated to me in conversation that he first introduced Mr. Harvey to you when you were Chief of the Bureau of Ordnance. Will you kindly write me in full your recollection of these matters, and what services, if any, Mr. Davies rendered which would entitle him to remuneration from this company in the above-named connection.

Very truly, yours, WM. ALLEN SMITH, *Secretary.*

To which I replied:

BOSTON, *October 7, 1893.*

DEAR SIR: I received your favor of October 6, informing me that Mr. J. R. Davies has made claim against the Harvey Steel Company, since the death of Mr. H. A. Harvey, for $10,000, for alleged services to Mr. H. A. Harvey in promoting at the United States Navy Department the adoption of the Harvey process as applied to armor plating for ships of war. You further state that Mr. Davies informed you in conversation that he first introduced Mr. Harvey to me as Chief of the Bureau Naval Ordnance.

In reply to the above, I beg to state that I first knew Mr. H. A. Harvey, the inventor of the "Harvey process," while on duty as inspector of ordnance at the navy-yard,

Washington, D. C., more than one year before I was appointed Chief of the Bureau of Ordnance; that Mr. Harvey presented himself, as I recollect, quite unaccompanied by any person whatsoever; that he offered for sale to the Government, or its representative in charge of the machine shops, some samples of tool steel treated by his then new process; that in conversation on this subject and method of treating steel I asked him if it (the process) could be applied with success to large masses, etc., having reference to armor plates. From this conversation alone, and without any person's influence or promotion, grew the application of the Harvey process to armor plating.

I did not make Mr. Davies's acquaintance until after I became chief of ordnance, and then in no manner connected with the Harvey process. I only recollect Mr. Davies in connection with an extraordinary remark he once made to me as to his intimacy with Gen. B. F. Tracy, then Secretary of the Navy. I do not think I saw Mr. Davies three times during the development of the Harvey plate, a period extending over four years. I never had any conversation with him in regard to Harvey armor, and I alone was charged with this development.

Mr. Harvey once asked me if it would facilitate matters if he had an agent in Washington to urge the sale of tool steel, and mentioned Mr. Davies's name. I replied—and your letter recalls this circumstance, which I had forgotten—that such an agent would be a disadvantage to him, as I preferred to talk with the principals on technical matters.

In conclusion, therefore, I beg to assure you that Mr. J. B. Davies rendered Mr. Harvey no assistance in Washington in any matter where the Bureau of Ordnance of the Navy Department was concerned.

I request the committee to consider my letter to the Harvey Steel Company, in regard to its indicating a total ignorance on my part of any relation or connection between Messrs. Harvey and Davies, and that this ignorance is evidence that Mr. Harvey and myself were not on particularly intimate terms. This statement is made as a correspondence between Harvey and Davies, and was developed in the Davies trial, of which everybody in the Harvey Steel Company apparently was in profound ignorance.

THE MEASURES TAKEN TO ASCERTAIN WHETHER THE PROPOSED ARMOR-PLATE PATENT WAS VALID.

Secretary Tracy and myself had much discussion on this subject before he consented to apply for precedence in examination by the Interior Department. It will be remembered as very important to me that the process patent, in regard to which I understand reference is principally made by the committee in its resolution, was granted in January, 1888, more than a year before Mr. Harvey presented himself to me at the Washington Navy-Yard. We thus did not have this feature to contend with specifically. The armor-plate patent is quite another matter. This, I admit, is not the place to present an argument on the validity of the instrument, particularly as the matter is now before the courts. I may, however, remark, very briefly, what principally influenced Secretary Tracy and myself in the matter of the request to expedite.

The armor-plate claims go far beyond the simple process feature of the patent of January, 1888. A new object is produced, in the manufacture of which there are a number of operations in novel combination. There is the carburizing feature under conditions not before utilized, producing an effect in depth of penetration of the carbon not before attained. A special furnace is demanded for this treatment under specifically described conditions of temperature not previously employed—the plate is chilled by cooling fluid in a manner and with apparatus specially described and enumerated. The result is an object not previously known or heard of except as an ideal to be hoped for.

The plate differs principally from all of those which preceded it in a particular which I believe has not been observed thus far, but which

had great weight with Secretary Tracy and myself. Heretofore all metal armor, in cooling after forging, acquired a uniform molecular crystalline structure which facilitates fracture—cracking—as the result of the impact of a projectile. Thus ice, which is clear and transparent, has a uniform crystalline molecular structure; a slight blow with a pointed instrument will develop the favoring lines of cleavage. But let clear ice be snowed upon and then the snow be melted, and then the whole subsequently frozen, and you have an ununiform crystalline structure and the blows of a sledge hammer will not induce fracture.

Now, this is the case with the Harvey plate and with no other armor plate. The vibratory shock at impact, which induces fracture, is interrupted at each infinitesimally thin plane parallel to the surface of the plate. Its energy is absorbed in heat, which is even visible in the great flash of white light when the plate is struck; the projectile, abruptly arrested in its course, crushes its own point and goes into minute fragments, thus annihilating its own energy and leaving the plate intact.

No other armor plate presents such effects at impact.

We thus felt that the Department was in possession of as much knowledge as the Patent Office examiners regarding the history of armor. We believed the plate to be novel and we, therefore, asked that the patent be given precedence that a legal contract with the owners might be consummated.

The saving to the United States through the adoption of the Harvey process is worthy the interest of the committee. The thickness of the armor has been universally reduced in all ships.

The saving in weight of armor through the changes thus rendered practicable in, for example, the designs of the battle ship *Iowa*, a larger ship than the *Indiana*, and carrying with this the protection of nearly 400 square feet more area, is about 660 tons. At $550 a ton, the average price paid, there is a saving of $350,000, a greater sum than will ever be paid to the Harvey Steel Company by the United States Government. I do not need to enumerate the consequent advantages in coal endurance, engine power, and a hundred other features.

There is another statement in regard to this saving prepared by Professor Alger, of the Bureau of Ordnance. It was prepared for Secretary Tracy. I do not know whether he used it or not. I will ask permission to read it. I asked him to make a comparison of the *Iowa* and *Indiana*. The *Iowa* was the first ship to which we applied the Harvey process, the first in which we noted the marked saving to the Government due to the Harvey process.

It would be difficult to compare the *Iowa* and the *Indiana* on the basis suggested, owing to the fact that the former vessel is about 1,000 tons greater displacement than the latter and has a greater protected area.

A true comparison, however, may be obtained in the following manner:

The ballistic resistance of a Harveyed armor plate is at least as great as that of a nickel-steel plate of 20 per cent greater thickness, and we know by actual tests that for any given protection we can save at least 20 per cent of armor weight by the use of the Harvey process.

I should like to say here that this 20 per cent estimate that Mr. Alger has made is the allowance which the Bureau of Ordnance makes in order to augment the severity of the ballistic tests. The contractors would not admit any greater estimate than that to be made. In their interest they felt that they should not do so; but a celebrated English expert has stated recently that the increase of invulnerability, or the increase of resistance due to surface hardening, is greater than 20 per cent, and has reached 50 per cent. Thus, this is a very small estimate, in my opinion and in the opinion of the present Chief of the Bureau of Ordnance. Now I will proceed with Professor Alger's statement.

The *Indiana* class having been designed to carry 2,679 tons of nickel-steel armor, the introduction of the Harvey process would have allowed giving them at least equal protection on a weight of 2,143 tons. The cost of the 2,679 tons of nickel-steel armor would have been $1,576,962, while the cost of 2,143 tons of Harveyed armor, including royalty and every other expense, would have been $1,395,093, and the resulting saving would have been $183,869 on the armor alone.

But in reducing armor weights by 530 tons we can also reduce hull weights, still retaining all the offensive and defensive qualities, speed, coal, endurance, etc., unchanged. This saving of hull weights would be at least 300 tons, costing about $120,000.

Consequently the introduction of the Harvey process enables us to save $323,869 on a single ship of the *Indiana* class.

That is Mr. Alger's comparison. I have only one more paragraph of my own statement to read.

It is not for me to more than refer to the magnitude of the task of creating a revolution in the method and principle of the manufacture of armor plate against the united technical arguments and unlimited capital of the steel and armor firms of the world. No one believed there was anything in Mr. Harvey's process. No person at Carnegie's or at Bethlehem would listen to it. It was opposed from the start. It has been fought by every armor firm in Europe, and the merit of the invention was decided on technical grounds and settled by the gun alone. I could bring you many witnesses who would tell you that I have done this thing, carrying this struggling inventor along with me and guarding the interests of the United States at the same time, as the terms of the contracts must convince you. I feel that at least I have not earned the censure of the United States.

That ends my statement, in so far as it was prepared by me before coming here.

Senator HALE. I did not get the dates exactly as you went along. You left the Department in January, 1893?

Mr. FOLGER. January 1, 1893.

Senator HALE. The letter from Mr. Harvey was written a few days before, in December?

Mr. FOLGER. Yes, sir; it was written three days before, in December.

Senator HALE. You left on leave?

Mr. FOLGER. I was granted two years' leave of absence. I remained on leave of absence something like eight months, and then gave up my leave of absence and applied to go to sea. [Exhibiting.] Here is the original letter of Mr. Harvey.

Senator HALE. When did you, then, enter into the employment of the Harvey Steel Company?

Mr. FOLGER. January 1. It dated back, although I did not make the arrangement until some ten days after I left.

Senator HALE. Was it a year from the following June that your service in this company expired?

Mr. FOLGER. The following June only.

Senator HALE. How long, then, were you in this employment?

Mr. FOLGER. Five months.

Senator HALE. How long did you receive a salary?

Mr. FOLGER. Five months.

Senator HALE. Where were you engaged then?

Mr. FOLGER. I was engaged entirely in the United States.

Senator HALE. That was before you went abroad?

Mr. FOLGER. Yes, sir.

Senator HALE. Some allusion has been made to the fact that before you technically left the Department you had determined to leave it, and *that that was known.* Will you not bring out what the facts were in *relation to that point* more fully than you have done?

Mr. FOLGER. As a matter of fact, it was generally believed that I left on account of the financial benefits from the Harvey Company. That is not true. I left and joined myself with the Harvey Company because I was certain that this plate would become a great feature in armor. I wished to remain connected with it. I knew that my professional reputation would gain and increase through any connection I might have with harveyed armor plate.

As a matter of fact, however, there were two motives for my leaving the Department. In the first place, I was completely run down. I had a great deal of work to do, as you may perhaps remember; perhaps more than you know about. I do not like to speak of my services, but I believe it is generally admitted that I am somewhat prominently connected with the development of the ordnance-producing resources in the United States. In 1892 I was quite run down with overwork.

Then, again, you may recollect that in the summer of 1892 a New York paper began an attack upon me in regard to my having insisted on having the turrets of our battle ships upright instead of inclined. I was criticised by this New York paper in such a manner as made me determined to leave the Department. I received the news of this criticism in Montreal when on leave of absence in the summer of 1892, and I determined to then quit ordnance duty if the Department did not defend me against such attacks. The Department did not pay any attention to the matter, and I resigned my appointment as Chief of Ordnance.

That consideration, the desire to connect myself with this invention for the sake of my reputation (for at that time the Harvey Company had no money, and its stock was not worth anything), and the condition of my health induced me to leave the Bureau of Ordnance.

Senator HALE. Had you determined to resign your position as Chief of the Bureau of Ordnance at any time before you did so resign; and if so, about what time, and was it known and discussed in the Department?

Mr. FOLGER. Oh, yes; it was known that I intended to resign. I told Secretary Tracy that I intended to resign fully a month before. I myself intended to resign about the first of the year, and three months before the end of the year I had that intention, but it was not generally known.

Senator HALE. Under your conditions would you have resigned, looking back now in your mind, if there had been nothing whatever to do with the Harvey patents; if that consideration had not existed?

Mr. FOLGER. I was so worn out that I would have been obliged to resign, or I should have been seriously ill. I could not have gone on with such a volume of work, Harvey plate or not.

Senator HALE. So you do not think now, looking back, that that was what controlled you?

Mr. FOLGER. I do not think so. I will recall to you that I quit the Harvey Company after five months, having a leave of absence of two years.

Senator HALE. You have been in the employment of the company since?

Mr. FOLGER. No, sir.

Senator HALE. You have received your regular salary since the five months?

Mr. FOLGER. I have received no salary from the Harvey Steel Company since I resigned in June, 1893.

Senator HALE. Except compensation for the work which you effected in England in reconciling matters with the agent.

Mr. FOLGER. No; nothing but the salary the last month. The salary was paid for June, and I received nothing after that. At that time I quit definitely.

Senator HALE. You paid your own bills abroad?

Mr. FOLGER. I paid my own bills abroad. They paid my expenses to go over there. After that I paid my own bills.

Senator HALE. They paid nothing more?

Mr. FOLGER. Nothing more.

Senator HALE. You have received nothing since?

Mr. FOLGER. I have received nothing since.

Senator HALE. Looking back over this record, Commander Folger, do you now see and recognize any mistake that you made, or do you think that in your present light you should have taken any other course?

Mr. FOLGER. With my present light and the notoriety of the thing, I believe I should not have gone into the Harvey matter. I do not, however, consider I did any wrong.

Senator BACON. I did not hear the Commander's response to the first part of the question.

Senator HALE. He said beyond the notoriety——

Mr. FOLGER. And newspaper comment, etc., I should not do it again with my present light. At the same time, I do not think I have done anything wrong, as I made no arrangement and received no remuneration prior to leaving duty.

Senator HALE. Was any act of yours in this connection while in the Department in any way controlled or influenced by any consideration in relation to the Harvey patent and any possible connection which you might have with it?

Mr. FOLGER. I think not, the terms that were made for the Harvey plate being about one-fourth what any other country pays for it. The fact that I had perhaps more to do with arranging those terms than anyone else, except the Secretary of the Navy, bears out my statement. The company itself thought it was very badly treated.

Senator HALE. Were you influenced in any official act which you did by any consideration that you might enter the employment of the company?

Mr. FOLGER. On the contrary, I think I was rather more severe, if anything, as to the terms.

Senator HALE. You think from the fact that it had been mentioned to you and you had rejected the offer you were more severe in your terms?

Mr. FOLGER. I think that I guarded my reputation in the terms, and that if anything I was more severe with them.

Senator HALE. I do not know that I have any further questions to ask Commander Folger.

Senator MCMILLAN. Was it not and is it not customary in the Navy for officers to obtain leave of absence and to take employment from companies outside?

Mr. FOLGER. Very generally so.

Senator MCMILLAN. And so it is in the Army.

Mr. FOLGER. So it has been in the Army.

Senator MCMILLAN. I have known several cases of that kind.

Mr. FOLGER. They are so employed very often.

Senator MCMILLAN. So there could be no impropriety on your part *in making the* arrangement after you had obtained your leave of *absence?*

Mr. FOLGER. I did not dream at the time of any impropriety. It used to be encouraged rather than otherwise.

Senator MCMILLAN. After the five months you left of your own accord?

Mr. FOLGER. I left of my own accord. I surprised the company by leaving them, I may say.

Senator MCMILLAN. What was your reason for leaving them?

Mr. FOLGER. Principally because they were not in a satisfactory financial condition.

Senator MCMILLAN. And you were poor?

Mr. FOLGER. I do not understand. I was tired out, and I went immediately to Gastein, in Austria, and remained under the care of a physician until I returned home. I had believed that leaving the Department and taking up a single subject, I could remain active. It had been the multiplicity of affairs in the Navy Department which had broken me down. I had suffered from insomnia in 1886, and I was therefore susceptible to it.

Senator CHANDLER. What have been the dividends on Harvey Company stock?

Mr. FOLGER. In this country they have paid three dividends, one of which, of 20 per cent, was paid immediately after the United States payment. There have been paid since then two annual dividends of 5 per cent each.

Senator CHANDLER. Making 30 per cent in all?

Mr. FOLGER. Thirty per cent in three years.

Senator CHANDLER. Have any dividends been paid from the receipts abroad?

Mr. FOLGER. The last two have been entirely paid from that source.

Senator CHANDLER. The two 5 per cent dividends?

Mr. FOLGER. Yes.

Senator CHANDLER. That is all the money you have received except the six months' salary and the 200 shares of stock?

Mr. FOLGER. Five months' salary.

Senator CHANDLER. Five months' salary and 30 per cent dividends on stock?

Mr. FOLGER. That is all.

Senator CHANDLER. What is the market value of the stock now?

Mr. FOLGER. It is not quoted on the market. It has not been offered for sale. I have heard of a few shares being transferred in New York at par.

Senator CHANDLER. You continue to hold your shares?

Mr. FOLGER. I do.

Senator CHANDLER. Do you hold any more?

Mr. FOLGER. No, sir.

Senator HALE. Are they $100 shares?

Mr. FOLGER. Yes, sir; $100 shares.

Senator CHANDLER. Has four-fifths of the stock of the company been purchased by foreign armor manufacturers?

Mr. FOLGER. Of the American company?

Senator CHANDLER. Yes.

Mr. FOLGER. No, sir.

Senator CHANDLER. Who holds the stock of the American company?

Mr. FOLGER. So far as I know, with the exception of a very small amount it is owned by the same people or their heirs who owned it when I joined the company in 1893.

Senator CHANDLER. You spoke of the foreign company; is there a separate foreign company abroad?

Mr. FOLGER. There is an English Harvey Company and there is a Harvey Company on the Continent.

Senator CHANDLER. Do you own any stock in either of those companies?

Mr. FOLGER. No, sir.

Senator CHANDLER. Who organized those companies and who owns the stock therein?

Mr. FOLGER. The work was done entirely by the agent of whom I have spoken, a Mr. Fox.

Senator CHANDLER. Who owns and controls the stock in those two foreign companies?

Mr. FOLGER. It is controlled entirely, so far as concerns the English company, I believe, by the armor manufacturers in England. There is a certain amount of stock owned by the American company.

Senator CHANDLER. So that the American company by its contract with the English company receives a certain portion of the profits made abroad?

Mr. FOLGER. Yes, sir.

Senator HALE. I suppose this is what is called the parent company?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. I suppose so. Is there also a continental company?

Mr. FOLGER. Yes, sir; also organized by this agent, and the principal owners of it apparently are the armor manufacturers on the Continent.

Senator CHANDLER. So you do know that the foreign companies which are receiving the royalty for the Harvey patent abroad are controlled by the armor manufacturers abroad?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. And the Harvey Company here receives a certain portion of their profits?

Mr. FOLGER. Owning a certain amount of stock in each of them.

Senator CHANDLER. Being the dividends on the stock which the parent company, to use Senator Hale's expression, own in the foreign companies?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. From what sources are the receipts of the foreign companies derived; purely from royalties?

Mr. FOLGER. Purely from royalties, I believe.

Senator CHANDLER. You say you helped to arrange the prices that should be paid by foreign governments to the foreign companies for the use of this patent?

Mr. FOLGER. Mr. Harvey and I had a conversation when I entered the Harvey Company in which I remarked, "I will enter your concern if foreign governments are charged more for their armor than is the United States." Beyond that I did not influence the price except in general consultation in New York after I entered the employ of the company.

Senator CHANDLER. You insisted, in fact, that the foreign price for the royalty should be larger than the home price?

Mr. FOLGER. I did.

Senator CHANDLER. And the royalty was arranged at how much a pound?

Mr. FOLGER. £8, I think it is abroad.

Senator CHANDLER. £8 a ton?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. About 2 cents a pound?

Mr. FOLGER. About 2 cents a pound.

Senator CHANDLER. About four times what is paid here?

Mr. FOLGER. About four times what the royalty is in the United States.

Senator HALE. Has the Harvey process been generally adopted?

Mr. FOLGER. It has been adopted everywhere.

Senator CHANDLER. When did you know of the letter of December 28, 1892, asking you to become——

Mr. FOLGER. It is dated December 28, and I received it within the time it takes the mail to bring a letter here, the 29th of December, perhaps.

Senator HALE. Is this the original letter?

Mr. FOLGER. Yes, sir; it is the original letter from Mr. Harvey.

Senator CHANDLER. Was that letter written in pursuance of a previous understanding with you that you should be employed?

Mr. FOLGER. It was probably written after Mr. Harvey had said something to me with regard to my leaving. I said, "Then you can write me a letter making a proposition to me."

Senator CHANDLER. How long before December 28, 1892, did you have this conversation with him?

Mr. FOLGER. I do not know positively that I had such a conversation. From there being such a letter I should say it was probably written after there was such a conversation.

Senator CHANDLER. You have stated the first talk which they had with you about employing you, which suggestion you rejected, as being about eighteen months prior to the 1st day of January, 1893, when you actually left the Department.

Mr. FOLGER. I should so imagine, because all the then heads of the concern, Mr. Percy Pyne, Mr. Clark, Mr. Sturgiss, and Mr. Harvey, who are now dead, were living. I remember I had such a meeting. I do not remember when it was. I stated it at about eighteen months prior.

Senator CHANDLER. From that time down to the 28th day of December, 1892, state all that took place between you and any representative of the company in reference to your employment after you should leave the Bureau.

Mr. FOLGER. There was probably a frequent request by Mr. Harvey for me to leave, but there was no talk on my part or promise on my part to enter their employ; and apart from my disinclination to discuss the subject, I knew that Mr. Harvey was not in a position to make any arrangement.

Senator CHANDLER. Was he continually talking to you about it?

Mr. FOLGER. Yes; I think it is probable that he asked me to leave many times.

Senator CHANDLER. And although he was in no condition to make any contract with you, the letter which he finally sent you on the 28th of December was signed by him?

Mr. FOLGER. Yes; as president of the company. He was president of the company.

Senator CHANDLER. The arrangement you made was for $5,000 a year salary and $20,000 of stock?

Mr. FOLGER. Yes, sir; and no other terms were ever mentioned before I left the Department.

Senator CHANDLER. You have spoken about the controversy that the newspapers made with you in the summer of 1892?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. There were attacks in the New York Herald?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. The attacks were made on account of some recommendations of yours about the turrets?

Mr. FOLGER. It was in regard to the turrets. Not having room properly to maneuver the guns, and foreseeing trouble ahead with increased velocities, and the Bureau of Construction not permitting me at that time to make the barbette diameter any larger, I insisted on the turrets being upright instead of inclined. Had I yielded to the recommendation of the Bureau of Construction, we could not now safely fire our guns.

Senator CHANDLER. That controversy arose in the newspapers how early?

Mr. FOLGER. The first article that I recollect seeing was in August or September, 1892.

Senator CHANDLER. You say you had made up your mind that on account of the bitter attacks which were made upon you in that connection you would leave the Department?

Mr. FOLGER. If the Department did not defend me against such attacks.

Senator CHANDLER. You say they did not defend you; do you mean in decision or in omission?

Mr. FOLGER. In omission. I considered that one who had worked as hard as I had should receive some protection at the hands of the Department when vilified by the press. The Department did not see fit to do so, and I——

Senator CHANDLER. Were not those attacks made upon you before the Department had adopted your plans of vertical turrets?

Mr. FOLGER. They were made before and afterwards.

Senator CHANDLER. Were not those attacks made while certain plans of yours were under consideration?

Mr. FOLGER. Yes.

Senator CHANDLER. Your plans were adopted by the Department?

Mr. FOLGER. Eventually.

Senator CHANDLER. They were all approved by the Department?

Mr. FOLGER. Yes, sir; eventually.

Senator CHANDLER. Then there was no occasion for you to feel hurt and to resign on account of that controversy if the newspapers had attacked you, as they always do——

Mr. FOLGER. I was new to it——

Senator CHANDLER. And the Department had sustained you. Then you had no reason to resign on that account.

Mr. FOLGER. I thought the Department, having approved my course, should have said so.

Senator CHANDLER. The New York Herald of December 12, 1892, in a communication from Washington, December 11, 1892, says that you have "finally succeeded in inducing Secretary Tracy to approve plans for vertical instead of conical-shaped turrets for the two new vessels authorized by the last Congress. This he considers a vindication of his course." I will leave out some of the adjectives here. Did you get the approval of the Secretary therein referred to about that time, December 11?

Mr. FOLGER. With regard to those turrets?

Senator CHANDLER. Yes.

Mr. FOLGER. There was one board meeting after another. There

would be a board meeting upon each ship, the constructors having opposed each case very strongly. The inclined turret was a suggestion of Mr. Hichborn.

Senator CHANDLER. I wish you would answer my question. [To the reporter.] Read the question.

The reporter read the question.

Mr. FOLGER. Of the upright turret?

Senator CHANDLER. Yes.

Mr. FOLGER. There were several decisions with regard to upright turrets, all of which were approved by the Secretary of the Navy.

Senator CHANDLER. Were they made before or about December 11?

Mr. FOLGER. That I do not remember.

Senator CHANDLER. Had all of the issue between vertical and conical turrets, which had caused you to think of leaving the Department, or which was one reason for leaving the Department, been disposed of before you left?

Mr. FOLGER. Yes, sir; I believe for all cases then under consideration.

Senator CHANDLER. And to your vindication?

Mr. FOLGER. To my vindication. But the matter came up again soon after I left.

Senator CHANDLER. What was the result of the final decision?

Mr. FOLGER. The turrets have still remained cylindrical.

Senator CHANDLER. With vertical sides?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. How long before December 28 was it publicly known that you were going out of the Department on the 1st day of January?

Mr. FOLGER. I think it was known in the early days of December.

Senator CHANDLER. How soon was it known and generally believed that you were going into the employment of the Harvey Company?

Mr. FOLGER. Oh, that was never positively known even by myself until after the 1st of January.

Senator CHANDLER. I understand that, but I wish to know how soon it was generally believed, a matter of public belief, in connection with the controversy about the turrets, that you would leave on the 1st of January and would go into the employ of the Harvey Company?

Mr. FOLGER. I do not know, sir. I do not know that it was believed at all before the 1st of January.

Senator CHANDLER. You would not infer that it was so believed because the newspapers so stated?

Mr. FOLGER. No. There were many surmises. They said I was going into all sorts of employment.

Senator. CHANDLER. I will read from the New York Herald of November 16, 1892—Washington correspondence of November 15, 1892:

Commander W. M. Folger, Chief of the Navy Bureau of Ordnance, intends to resign. January 1 is the date fixed for the resignation to go into effect.

Mr. FOLGER. What is the date of that article?

Senator CHANDLER. November 15, 1892. It proceeds:

This information Commander Folger has conveyed to some of his intimate friends, and it would appear that he has also notified the Secretary of the Navy. * * * The resignation, however, has not been formally tendered, according to a statement made by Commander Folger to a brother officer to-day, but he would neither deny nor confirm the report that he intended to leave on January 1.

As a matter of fact, now, was that statement correct?

Mr. FOLGER. Since it is published there it possibly or probably was correct. I really do not remember, however. I did not fix any dates

in my mind. I do not know how long it was before I left that it became notorious.

Senator CHANDLER. You would not undertake to say that this is incorrect?

Mr. FOLGER. Oh, no. I would not undertake to say that at all.

Senator CHANDLER. I continue to read:

Rumor has it that he will obtain a year's leave, during which he will act as an agent for the harveyized armor plate, and if successful at the expiration of his leave he will resign his commission as a commander in the Navy. It is reported that the Harvey people have offered him a salary of $12,000 a year, and that he has the opportunity of adding considerable to this sum by acting also as the agent for the Carpenter Projectile Company.

Do you remember seeing that statement?

Mr. FOLGER. I probably saw it at the time. I do not remember it now.

Senator CHANDLER. What do you say as to whether or not the Harvey Company offer had been made to you as early as November 15, 1892?

Mr. FOLGER. That is untrue.

Senator CHANDLER. That was not true?

Mr. FOLGER. No, sir.

Senator CHANDLER. The Chicago Evening Post of November 26, 1892, under date line "Washington, November 26," says:

It is understood to be definitely settled that Capt. W. T. Sampson will be appointed Chief of the Bureau of Ordnance to succeed Commander W. M. Folger, who is going abroad early in the coming year in the interest of the Harvey plate and other ordnance matters.

Is that a statement of fact or a mere surmise?

Mr. FOLGER. It is a mere surmise. The newspaper reporters, you know, make up that sort of thing.

Senator CHANDLER. The New York Herald of November 17, 1892, in a telegram from Washington dated November 16, 1892, says:

Commander Folger's contemplated resignation, exclusively announced in this morning's Herald, was a very interesting bit of news to the naval colony in this city.

Mr. FOLGER. That is in New York?

Senator CHANDLER. No, Washington.

Commander Folger tells some of those who have asked him about the report that he has no intention of "resigning from the Navy." He probably means to hold on to his commission as a commander in the Navy. It was the resignation of his position as Chief of the Bureau of Ordnance that the Herald referred to. His intimate friends say there is no doubt of this. The only doubt they have is as to what he will do after he resigns and gets his year's leave of absence on January 1. So many big salaries have been offered him by various firms that they are not sure which one he will accept.

Now, does this article indicate that substantially what took place January 1 was known publicly November 16, 1892?

Mr. FOLGER. It indicates that it was talked about.

Senator CHANDLER. It does not indicate that it was known?

Mr. FOLGER. It was not known.

Senator CHANDLER. And as a matter of fact you continue to insist that you did not have any understanding——

Mr. FOLGER. I did not.

Senator CHANDLER. That you did not have any understanding with the Harvey people until after the 1st of January?

Mr. FOLGER. I did not, notwithstanding the fact that you find it so stated in the newspapers.

Senator CHANDLER. So that was all surmise?

Mr. FOLGER. Yes, sir; it was all surmise.

Senator CHANDLER. The New York Times of November 17, 1892, has a communication dated Washington, November 16, from which I read this extract:

There is some talk to-day of Sampson becoming the Chief of the Bureau of Ordnance, should Commodore Folger resign from the chiefship and go on leave. Folger denies that he intends to leave the service, but his friends in and out of the Department are authority for the statement that he has formed an alliance with domestic projectile manufacturers and will act as their agent in Europe.

Did you deny at that time that you intended to leave the Bureau?

Mr. FOLGER. Did I deny what?

Senator CHANDLER. Did you deny November 16 that you were going to leave the Bureau?

Mr. FOLGER. No; probably not. I did not probably deny it. I very rarely spoke to newspaper men. You perceive they say Commander Folger's friends say so and so.

Senator CHANDLER. Did you have any negotiations at that time with any parties other than the Harvey Steel Company for employment during your year's leave of absence?

Mr. FOLGER. I declined to have any negotiations with any persons.

Senator CHANDLER. Were you receiving the large offers which the newspapers suggest?

Mr. FOLGER. I did not receive any offers from anybody. No terms were mentioned to me.

Senator CHANDLER. Was anybody negotiating with you for your services after you should leave the Department?

Mr. FOLGER. A number of persons asked me to go with them after I left, but I declined to discuss the subject until after I had left.

Senator CHANDLER. Who were asking you to serve them?

Mr. FOLGER. The Bethlehem Iron Company and the Carnegies were two, especially.

Senator CHANDLER. Any projectile companies?

Mr. FOLGER. Both the Carpenter Projectile Company and the Sterling Projectile Company.

Senator CHANDLER. The Herald of December 24, 1892, in a communication from Washington, December 22, 1892, gives the letter, or what purports to be the terms of President Harrison's letter to you. As it is complimentary to you, I will read it.

President Harrison, in accepting his resignation, to take effect January 2 next, says: "It is due to you that I should say further that your achievements in the Washington gun shop and as Chief of the Bureau of Ordnance in the Navy Department have been most notable and creditable. You have done a very great work for the Navy, and I beg to express the hope that with restored health you may yet further contribute to the renown of a distinguished profession."

When did you first know of that letter?

Senator HALE. Who is that letter by?

Senator CHANDLER. It is President Harrison's letter accepting the resignation.

Mr. FOLGER. What is the date of it?

Senator CHANDLER. It is quoted in the Herald of December 24, 1892. It does not give the date of President Harrison's letter, but it says that President Harrison, in accepting your resignation to take effect January 2 next, says so and so. When did you first know of that letter?

Mr. FOLGER. Secretary Tracy told me that the President had written me a letter, and I received it next day; but as to the date——

Senator CHANDLER. Was it some time in December?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. What was the date of your resignation?

Mr. FOLGER. January 1 was the date of my resignation.

Senator CHANDLER. What was the date of the tender of your resignation?

Mr. FOLGER. December; between the 1st and the middle of December some time; I do not remember exactly.

Senator HALE. To take effect January 1?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. You knew nothing of this letter until Secretary Tracy told you?

Mr. FOLGER. No. The Secretary was to write me a letter; he offered to write me a letter, and then he learned of what the President intended to do. The President not only did that, but he sent for me and told me——

Senator CHANDLER. That he regretted to have you leave?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. That was a mark of distinction. Did you ever know any other of your officers to be so treated?

Mr. FOLGER. I do not know of any such case.

Senator CHANDLER. To come to a different subject, how long have you been a Navy officer?

Mr. FOLGER. Since the 20th of September, 1861.

Senator CHANDLER. Thirty-five years. During that period by how many different companies or associations have you been employed who were doing business in any way with the Government?

Mr. FOLGER. Previous to the occasion as to which you are investigating I was employed by the Gatling Gun Company and the Simonds Rolling Machine Company, of Fitchburg, Mass.; by the Gatling Gun Company in 1874, and by the Simonds Rolling Machine Company in 1886.

Senator CHANDLER. How long were you employed by the Gatling Company, and what were your then existing orders from the Navy Department?

Mr. FOLGER. I was employed by the Gatling Company two years.

Senator CHANDLER. On leave of absence for that purpose?

Mr. FOLGER. Yes, sir. I was their European agent for two years.

Senator CHANDLER. Were you paid a salary or a share of the profits?

Mr. FOLGER. I was paid a salary.

Senator CHANDLER. And not by any share in the profits?

Mr. FOLGER. I had no shares in the company.

Senator CHANDLER. How long was your connection with the Simonds Company? It is the Simonds Rolling Machine Company?

Mr. FOLGER. Yes, sir; of Fitchburg, Mass.

Senator CHANDLER. How long were you connected with them?

Mr. FOLGER. I was connected with them about five months.

Senator CHANDLER. How long?

Mr. FOLGER. About five or six months, as I recollect; five months.

Senator CHANDLER. You were on leave of absence for that purpose?

Mr. FOLGER. I was on leave of absence at the time.

Senator CHANDLER. And that employment, as well as the employment with the Gatling Gun Company, was with the knowledge of the Navy Department?

Mr. FOLGER. Yes, sir. They knew when I had gone, they knew when I came back, and they knew what I was doing while I was away, and it was with their approval.

Senator HALE. Let me ask you whether your employment by the

different companies in work of that character was not in the line of your professional duty, tending all the time to enlarge your knowledge of ordnance?

Mr. FOLGER. Yes, sir; especially with the Gatling Company. It was of great advantage to me. It gave me two years' experience with ordnance stations in Europe, and when I came back to my duty in the Ordnance Department I was better equipped as to foreign developments than perhaps many others. As to the other employment, although it did not develop in this country to ordnance matters, it did somewhat in England. The Simonds plan did not develop into making many projectiles. They have now degenerated into making bicycle balls.

Senator HALE. What?

Mr. FOLGER. Bearing balls for bicycles.

Senator CHANDLER. You rendered no service to the Gatling Company in this country?

Mr. FOLGER. No, sir.

Senator CHANDLER. And you had nothing to do with any sales of Gatling guns in the United States?

Mr. FOLGER. Never since my employment by them.

Senator CHANDLER. Has the Navy Department ever purchased Gatling guns?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. What number?

Mr. FOLGER. I do not know. It never purchased any in my time.

Senator CHANDLER. When you were Chief of the Bureau it never purchased any?

Mr. FOLGER. It did not.

Senator CHANDLER. You had nothing to do officially with promoting Gatling guns in this country?

Mr. FOLGER. No, sir.

Senator CHANDLER. Now, about the Simonds Rolling Machine Company; what was the nature of your employment with them?

Mr. FOLGER. I found Mr. Simonds in London ill and unable to attend to his affairs, and he turned over to me the development of the company in London.

Senator CHANDLER. What was the name of the company?

Mr. FOLGER. The Simonds Round Forging Company, I think. Have you it there?

Senator CHANDLER. I do not think I have the name; I have only the name of the Fitchburg company—the home company.

Mr. FOLGER. I think the company in London was called the Simonds Round Forging Company; but I really do not remember.

Senator CHANDLER. There was organized in London a company in addition to the home company in Fitchburg?

Mr. FOLGER. It was before the Fitchburg company. The London company was organized first.

Senator CHANDLER. I have here the Simonds patents—two in 1885 and one in 1886.

Mr. FOLGER. It was in 1886 that I went abroad.

Senator CHANDLER. State here what your financial arrangement with the Simonds Company was; whether it was for a salary or an interest in the business?

Mr. FOLGER. In London my expenses were paid and I was given an interest in the business.

Senator CHANDLER. In the shape of stock in the company?

Mr. FOLGER. In the shape of stock and a cash consideration on the terms of the sales.

Senator CHANDLER. That is the arrangement which was made there?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. For a specific sum?

Mr. FOLGER. I think it was for a percentage.

Senator CHANDLER. On the sales?

Mr. FOLGER. Yes.

Senator CHANDLER. On the sales of what?

Mr. FOLGER. On the sales of the patents to an English company.

Senator CHANDLER. The patent was for making what?

Mr. FOLGER. The patent at that time was for making all sorts of elongated objects that could be rolled out between two dies.

Senator CHANDLER. Was that covered by those patents?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Did this arrangement cease after five months?

Mr. FOLGER. My connection with the company ceased, with the exception of the stock, which I still own.

Senator CHANDLER. What did you do then?

Mr. FOLGER. I came home and went to sea.

Senator CHANDLER. How long did you remain at sea?

Mr. FOLGER. I stayed in the Department a few months, I think, and then I went out in command of the *Quinnebaug*. That was another occasion of my giving up part of my leave.

Senator CHANDLER. You came back and went into the Department?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Where were you in the Department after giving up the contract with the Simonds people?

Mr. FOLGER. In the Bureau of Ordnance.

Senator CHANDLER. Did the Bureau of Ordnance have occasion to use any of the Simonds patents?

Mr. FOLGER. No, sir.

Senator CHANDLER. While you were there?

Mr. FOLGER. No, sir.

Senator CHANDLER. At the end of how many months did you say you went to sea?

Mr. FOLGER. I was detached after three or four months, or four or five months.

Senator CHANDLER. What became of your stock in the Simonds Company; do you still hold it?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Has the company been merged into any other company?

Mr. FOLGER. Do you mean the English stock? I sold my English stock in London. I did not own any after I left, but the greater part of the stock in the American company I still own.

Senator CHANDLER. You have it now?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Is that company in existence now? Do you hold the same stock, or has it been merged into some other company?

Mr. FOLGER. It is still in existence.

Senator CHANDLER. Is it a live company, doing business?

Mr. FOLGER. Yes, sir; they made 39,000,000 bicycle balls last year.

Senator CHANDLER. That stock you say you still hold?

Mr. FOLGER. Yes, sir; I hold it.

Senator CHANDLER. You hold it, and it has been profitable?

Mr. FOLGER. It has been profitable. They have paid a dividend *every year except two* since I have owned the stock.

Senator CHANDLER. Were any of the Simonds patents transferred to any other company?

Mr. FOLGER. Not that I remember at present.

Senator CHANDLER. How about the Cayley and Courtman patent?

Mr. FOLGER. That is another patent which has been transferred to the E. W. Bliss Company, of Brooklyn. Simonds has not anything to do with that.

Senator CHANDLER. Certain original Simonds patents I find were made the basis of the Cayley and Courtman English patent. You are aware of that fact, are you not?

Mr. FOLGER. No. I knew that Cayley had business arrangements with Mr. Simonds. I happen to know historically that Cayley transferred some patents to E. W. Bliss, of Brooklyn. Beyond that there is no Simonds connection.

Senator CHANDLER. Those are patents for hollow projectiles and shells, and for apparatus used in their manufacture.

Mr. FOLGER. That is true. The right to Simonds devices in England was transferred to what was called the Projectile Company, which owns the Cayley and Courtman devices in London. That is true.

Senator CHANDLER. Did they acquire the Simonds patent?

Mr. FOLGER. Yes; in Europe.

Senater CHANDLER. Did you have anything to do with that business?

Mr. FOLGER. I had nothing whatever to do with that transaction. It was long after I left it.

Senater CHANDLER. You have knowledge of the fact that the Cayley-Courtman people obtained the patents in this country for hollow projectiles and shells forged from a solid piece of iron, based upon the Simonds process?

Mr. FOLGER. The Cayley and Courtman patents were not based on the Simonds process. The Simonds process was a method which rolled an object between dies like that [exhibiting], and in the Cayley-Courtman method they took a block of metal and punched it out endwise.

Senator CHANDLER. Did Cayley and Courtman acquire Simonds's patent for the manufacture of hollow projectiles?

Mr. FOLGER. In England, yes; but the Cayley-Courtman method of making projectiles, which is quite separate from the Simonds device, was a patent acquired, I think, before Simonds went to Europe, and has since been transferred to the Brooklyn concern, the United States Projectile Company.

Senator CHANDLER. To the Bliss Company. Then you undertake to say, or your impression is, that the English patent for the manufacture of hollow projectiles and shells, and improved apparatus to be used in such manufacture, which includes the three Simonds patents, is not for the invention which was patented in this country February 24, 1891, and which reads, "Hollow projectiles and shells for ordnance forged from a solid piece of iron or steel in contradistinction to being hollowed out by means of boring tools." You say those were separate things?

Mr. FOLGER (examining patents). This is the Cayley-Courtman patent, and Simonds had nothing to do with it.

Senator CHANDLER. The patent expressly recites that the process used is the Simonds process. There is the recital; look at it.

Mr. FOLGER. I do not see the point.

Senator CHANDLER. The point I wish to get at is that Cayley-Courtman acquired in England certain Simonds patents for making hollow projectiles, and that they afterwards patented the same thing in the United States.

Mr. FOLGER. It is possible that that occurred. We may confuse terms. The Simonds process, properly so known, could not be applied to the Cayley-Courtman principle. Mr. Simonds, however, as I recollect, took out a number of patents, by which he expected to affect the shape of hollow projectiles that had been previously rendered hollow from a block on the Cayley-Courtman process. It is possible that this patent refers to that. Nothing ever came of it. The world has never made any projectiles in that way. It was tried, and it could not be done.

Senator CHANDLER. Did all of the processes which you see described here go into the hands of the Bliss Company?

Mr. FOLGER. I do not know whether the Simonds connection went into the Bliss Company. The Cayley-Courtman matter did. I never heard about the other. I am quite certain that Bliss never used any of Simonds's ideas.

Senator CHANDLER. Did you have anything to do with the Simonds patents and the Cayley-Courtman matter that were transferred to Bliss & Co.?

Mr. FOLGER. No; not in the slightest degree.

Senator CHANDLER. Did you ever have any stock in the Cayley-Courtman Company?

Mr. FOLGER. Never.

Senator CHANDLER. Or in the Bliss Company?

Mr. FOLGER. Never; nor in the Bliss Company.

Senator CHANDLER. You never have been pecuniarily connected in any way with the work of the Bliss Company?

Mr. FOLGER. Not in the most remote degree.

Senator CHANDLER. Do you know who the stockholders are in that company?

Mr. FOLGER. I do not know one of them.

Senator CHANDLER. As a matter of fact, the Bliss Company was organized, the company which is called the——

Mr. FOLGER. The United States Projectile Company.

Senator CHANDLER. The United States Projectile Company, and which was called the E. W. Bliss Manufacturing Company——

Mr. FOLGER. I think that last-named company still exists.

Senator CHANDLER. The E. W. Bliss Company was a later company, which acquired the Cayley-Courtman patents, did it not?

Mr. FOLGER. I think it was the Bliss Company which acquired these patents.

Senator CHANDLER. You had no financial connection with it at all?

Mr. FOLGER. Absolutely no connection whatever.

Senator CHANDLER. Was the United States Projectile Company one of the Bliss organizations.

Mr. FOLGER. It is, I believe, the organization made on the Cayley-Courtman process and patents.

Senator CHANDLER. Let us be accurate about it if we can. Was there the E. W. Bliss Manufacturing Company and also the United States Projectile Company, two companies?

Mr. FOLGER. I believe the first is his older and general manufacturing company. He makes dies and taps and all sorts of commercial articles.

Senator CHANDLER. While the Projectile Company was organized principally with reference to this Government work?

Mr. FOLGER. Yes.

Senator CHANDLER. You had no interest directly or indirectly in *either of them?*

Mr. FOLGER. No; I had no interest whatever in either of them.

Senator CHANDLER. You may state, if you have knowledge, what kind of contracts and what amount of contracts the Navy Department has placed with the E. W. Bliss Company?

Mr. FOLGER. I could not tell you, Mr. Chandler.

Senator CHANDLER. Were orders—I do not speak——

Mr. FOLGER. Orders were given during the whole of my time.

Senator CHANDLER. Were orders given them during your time in the Bureau?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Were large orders given to the Bliss Company?

Mr. FOLGER. Orders were given to the Projectile Company. I do not remember the size.

Senator CHANDLER. I speak not now of the Whitehead torpedo, but orders were given them?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. For what?

Mr. FOLGER. For projectiles.

Senator CHANDLER. You say that none of those projectiles was made, according to your belief, under the Cayley-Courtman or Simonds patents?

Mr. FOLGER. They were made under the Cayley-Courtman patents, but not under the Simonds patents.

Senator CHANDLER. You do not consider that the Cayley-Courtman patents were a development of the Simonds process?

Mr. FOLGER. The Cayley-Courtman patents were not at all a result of what is called the Simonds process. The Cayley-Courtman process was the evolution of a shell by a straight ramming in one direction of a plunger. The Simonds process is the rolling out between two dies.

Senator CHANDLER. With a mandrel inside?

Mr. FOLGER. There is no mandrel inside.

Senator CHANDLER. Not in the Simonds process?

Mr. FOLGER. I believe an attempt was made to put a mandrel inside the shell in the rolling process, but the idea was not a success.

Senator CHANDLER. Were orders given to the United States Projectile Company or the E. W. Bliss Company for Whitehead torpedoes while you were in the Department?

Mr. FOLGER. Yes, sir; to the Bliss Company. That was developed in my time.

Senator CHANDLER. What was the arrangement made by the Navy Department with the English owners of the Whitehead torpedo patent?

Mr. FOLGER. The Austrian owners?

Senator CHANDLER. I will say the foreign owners?

Mr. FOLGER. We sent an officer, Lieutenant McLean, and an expert, a mechanical engineer from Bliss, over to Fiume, in Austria, to learn the method of manufacture. Bliss offered to the Secretary of the Navy to take up the manufacture of the Whitehead torpedo in this country.

Mr. CHANDLER. And we acquired the right to manufacture?

Mr. FOLGER. The Bliss Company bought the right, and paid the royalty.

Senator CHANDLER. Did the Bliss Company purchase any torpedoes abroad?

Mr. FOLGER. I think they purchased two as models.

Senator CHANDLER. Only two? Has the United States ever bought any service Whitehead torpedoes abroad?

Mr. FOLGER. No, sir.

Senator CHANDLER. All our Whitehead torpedoes have been made by the Bliss Company after they made the purchase of the right to manufacture the Whitehead torpedo in this country?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Those orders were given while you were Chief of the Bureau of Ordnance?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. You had no pecuniary interest whatever in any of those contracts?

Mr. FOLGER. No, sir.

Senator CHANDLER. Now, I will ask you about the Carpenter Steel Company, of Reading. Have you ever had any interest in that company?

Mr. FOLGER. Never.

Senator CHANDLER. Have you stated all the companies or associations that have had dealings with the Government with which you have been connected pecuniarily?

Mr. FOLGER. After I left I was connected for five months with the American Projectile Company, which is in Lynn, Mass.

Senator CHANDLER. State the history of that company, what it was formed to do, and what it has done.

Mr. FOLGER. The company made what is called the electric welded shell. They would weld a point of steel——

Senator CHANDLER. On the end of the projectile?

Mr. FOLGER. Yes, sir. I was their mechanical adviser during five months, and I hoped to connect them with the Harvey process. I endeavored to have their shells treated superficially by the Harvey process, and believed they would become better by reason thereof. They were the competitors and rivals of the Bliss Company, of which you have been speaking. I was their mechanical adviser and engineer during the time after I left the Department until I went to Europe.

Senator CHANDLER. In 1893?

Mr. FOLGER. Yes, sir; 1893. I endeavored to prevail upon the Harvey agent to take up the sale of the American Projectile Company's wares. He tried to do so, but failed. He had firing tests after I left him and went to Austria. I simply turned the business over to him. I did not desire, in the then state of my health, to have anything to do with it personally.

Senator CHANDLER. Was that the last you had to do with the matter?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. What sort of pecuniary arrangement did you make? I do not mean as to the amount, but whether you were employed on a salary or were to receive an interest in the concern.

Mr. FOLGER. On a salary and some shares. The agent having failed in Europe, I returned the shares, and do not possess them at present.

Senator CHANDLER. You never really accepted them?

Mr. FOLGER. Or, rather, I returned them.

Senator CHANDLER. Were you paid for your services?

Mr. FOLGER. I was paid a salary for my services while acting as their engineer.

Senator CHANDLER. So now, the salary having ended and the shares having been returned, you have no connection with the company?

Mr. FOLGER. Absolutely no connection.

Senator CHANDLER. That is the American Projectile Company, of Lynn, Mass.

Mr. FOLGER. Yes.

Senator CHANDLER. Were you familiar with the Ritchie processes for treating nickel?

Mr. FOLGER. Yes; and I had something to do with the nickel contract. I think that and the Harvey contracts are among the best bargains the Navy has ever made.

Senator CHANDLER. The purchase of nickel was made under a special appropriation. Of whom was it purchased?

Mr. FOLGER. It was purchased from the Canadian Copper Company.

Senator CHANDLER. What was the total amount of the purchase from that company, or what has been the amount up to this time?

Mr. FOLGER. I think about $400,000 of the million dollars was not expended for nickel. Year after year we would ask to have a hundred thousand dollars of the nickel million to be given to us for experimental purposes. The first purchase amounted to—you probably have it there more definitely than I can remember.

Senator CHANDLER. There is some information here, but I wish your memory in a general way as to how much of the million dollars has been expended.

Mr. FOLGER. I think six hundred and some odd thousand dollars. I do not remember, Mr. Chandler. I only know——

Senator CHANDLER. The Government furnishes the nickel in all its armor contracts?

Mr. FOLGER. Yes, sir; the Government believed that if it allowed the companies to buy the nickel it would be at a disadvantage pecuniarily, and for that reason it made its own bargains for nickel and for the Harvey process. The Government was charged $1 a pound by the only other available source of nickel at the time we made the contract. We, however, purchased nickel for something like twenty odd cents.

Senator CHANDLER. Now, I wish, leaving these subjects, to ask you about the armor contract made with the Carnegie Company. Did you have anything to do with it?

Mr. FOLGER. I did not have much to do with it. It was arranged by the Secretary of the Navy, and as I recollect it he gave them the same terms that the Bethlehem Company had received. I played a very small part in that transaction.

Senator CHANDLER. Will you state whether you did or did not assist Secretary Tracy in his negotiations with the Carnegie Company?

Mr. FOLGER. I practically had nothing to do with it.

Senator CHANDLER. Were you consulted as to the legality of making a private contract for $5,000,000 worth of armor?

Mr. FOLGER. No, he would not consult me——

Senator CHANDLER. On a legal question?

Mr. FOLGER. No.

Senator CHANDLER. You knew, as a matter of fact, that the Bethlehem contract had been made after advertisement and competition?

Mr. FOLGER. Oh, yes, sir; I knew that.

Senator CHANDLER. You knew that Secretary Tracy was making this contract with the Carnegie Company without any advertisement?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. And you did not call his attention to that fact?

Mr. FOLGER. He was quite aware of it.

Senator CHANDLER. Do you know, as a matter of fact, of any legal authority to make a contract of that kind without advertising and competition?

Mr. FOLGER. I did not know of any authority which prevented it.

Senator CHANDLER. At any rate, you knew that the Secretary took

the responsibility of it. Did you have any knowledge that it intended to keep those negotiations secret from the Bethlehem pany until they were made?

Mr. FOLGER. I do not remember that that was the case.

Senator CHANDLER. Can you give any opinion one way or the as to whether they were kept from them?

Mr. FOLGER. I think they knew all about it.

Senator CHANDLER. How soon? You think they knew all abou negotiations?

Mr. FOLGER. Yes, sir; I think so.

Senator CHANDLER. From the time the Secretary commenced with Mr. Carnegie?

Mr. FOLGER. I think they knew all about it. They were very cut up about it.

Senator CHANDLER. Were they cut up about it while the neg tions were going on, or after they found out about it?

Mr. FOLGER. They were cut up after the negotiation was goin

Senator CHANDLER. How do you know that fact?

Mr. FOLGER. I seem to recollect that such impression was upon me.

Senator SMITH. What were the reasons given at the time for ta away the contract with the Bethlehem Company and giving it t Carnegie people?

Mr. FOLGER. At one time it was found that the Carnegie p could not make the heavy armor, and I think they exchanged for armor. After the contracts were given out it was found that the h plates could not be produced by Carnegie by his then plant. A rate, they made a transfer from one firm to the other, giving the h armor to Bethlehem, as I recollect.

Senator SMITH. I understand the Bethlehem Company originall the whole of the contract for armor.

Mr. FOLGER. Yes.

Mr. SMITH. Did you ever hear that any part of the contract, o of it, was taken from the Bethlehem people and given to the Car people?

Mr. FOLGER. I do not think any armor was given under the co without an exchange of other plates. I do not think there eve anything taken away from one and given to another witho exchange of an equal amount. The original Bethlehem contrac made, and then other ships were authorized by Congress, and tract was made with the Carnegie people for armor for these vessels.

Senator SMITH. Are you aware of the fact that Secretary Tracy from the Bethlehem people the furnishing of 3-inch plates and s tuted therefor three 1-inch plates, and had the Linden Steel W furnish them?

Mr. FOLGER. I remember there was a transaction of that descri where for armor, for plates for which the price of armor was pa higher price), cheaper plates, called construction plates, were s tuted and the contract was given to one of the manufacturing which could make such plates. I recollect that there was a s money saved by the transaction. I do not remember the details Those are all on record, and Mr. Chandler probably has them all in his file.

Senator CHANDLER. No; I have not the memorandum about that *ter. I have* a memorandum to ask you about the substitution by *rétary Tracy* of three separate plates of 1-inch each for 3-inch ar

Mr. FOLGER. It was the other way.

Senator SMITH. That is the point I was asking about.

Mr. FOLGER. Was it not the substitution of 1-inch plates for 3-inch plates?

Senator CHANDLER. It was the substitution of three 1-inch plates for solid 3-inch plates. Was your professional opinion asked about that matter?

Mr. FOLGER. I do not remember about that case.

Senator CHANDLER. As a matter of opinion, would three 1-inch plates put over each other have the strength of one solid 3-inch plate?

Mr. FOLGER. No, sir; not by perhaps 25 per cent.

Senator CHANDLER. You do not remember advising Secretary Tracy on any point of that sort?

Mr. FOLGER. I do not remember the details of it.

Senator CHANDLER. Now, I am going to ask you about the Harvey patents. Harvey had been pressing the Department to buy tool steel made by his process?

Mr. FOLGER. Harvey came to me originally, as I recollect now, with some tool steel, in which I saw that the carbon had penetrated to a greater depth than I had ever before been aware of. It was something in which for ten or fifteen years I had been deeply interested, having myself tried to produce such an armor plate. I was immediately struck with the depth of carburization, and asked him if he could obtain this result with a larger mass.

Senator CHANDLER. He thought he could?

Mr. FOLGER. He thought he could.

Senator CHANDLER. And the testimony somewhere, either before this committee directly or in the testimony taken in the Davies suit, shows that you suggested the extension of the Harvey process from tools to armor plate?

Mr. FOLGER. I do not claim to have invented the Harvey process.

Senator CHANDLER. How much short of it are you when you found that Harvey, by carbonizing steel and chilling it, had made an exceedingly hard surface on tool steel (a few hundred dollars' worth of material so treated he was trying to sell to the Government), and you suggested to him to apply the process to armor plate, and proceeded to arrange with him to experiment with it and to take out a patent for it? If there was any novelty in transferring the process from tool steel to armor plate, how much short are you of being the inventor thereof?

Mr. FOLGER. I venture to observe that Harvey presented a novel feature in the depth obtained by a patented process. I did not know at the time anything about the method by which it had been accomplished. I had endeavored a number of times to get carbon to the depth that Mr. Harvey presented to me and had failed. His process was to me at that time entirely an unknown method. I considered it to be one of the most important developments that had been made in the arts—this changing the character of iron by a novel method in the application of carbon, judging by the results. It did not occur to me at all that I was inventing anything in the way of a plate, because this man offered to me the process for which he had already a patent by which he was enabled to supercarbonize iron or steel.

Senator CHANDLER. You bought of him for the Government $300 worth of tool steel, as the record shows.

Mr. FOLGER. I do not know what the amount was.

Senator CHANDLER. Assume that it was about $300 worth. You made this suggestion to him. He readily acceded to it, and thereupon

the various steps that appear in the record were taken. First, a small experiment was made by him at Newark on armor plate?

Mr. FOLGER. Yes.

Senator CHANDLER. Then a larger experiment was made by you at the navy-yard. Then the contract was made, and pending those proceedings his application for an extension of the patent to armor plate was rejected by the Patent Office?

Mr. FOLGER. I did not know about that. You have developed that fact.

Senator CHANDLER. You say you did not know that?

Mr. FOLGER. Yes; I did not know it.

Senator CHANDLER. You did not ascertain that the application was rejected at the Patent Office as being the well-known process of hardening by chilling. You did not know that fact?

Mr. FOLGER. It was not a patent for hardening by chilling.

Senator CHANDLER. I speak of the ground of rejection.

Mr. FOLGER. Oh! I beg your pardon.

Senator CHANDLER. I speak of the ground of rejection, whether erroneous or not. The process having previously been applied only to tool steel, and you having suggested its application to armor plate, his application for a patent on its application to armor plate was rejected; and you say you did not know that fact?

Mr. FOLGER. I did not know it at the time. I know it only since you have developed it in this investigation.

Senator CHANDLER. You did not know that fact. Your negotiations with him went on and the Secretary wrote a letter on your recommendation asking that a new application which he had made be expedited?

Mr. FOLGER. I do not think our letter or the Secretary's letter said anything about a new application, but the request was that the application for the patent should be expedited.

Senator CHANDLER. As a matter of fact, it was, as the records show, a new application, made after this rejection of which I am speaking?

Mr. FOLGER. But I have not the faintest recollection of anything of the sort.

Senator CHANDLER. Assume that to be the fact. Then you were asking the Secretary to procure the expedition of a new application of Harvey for his process in connection with armor plate, following a rejection of an application of that kind, if the facts as I state them are correct.

Mr. FOLGER. Yes; but I did not know it.

Senator CHANDLER. Then the process went on, as appears in the record, and you did arrange the experiments that were made, and agreed that the Government should pay the expense of the experiments, and you arranged the price that should be paid.

Mr. FOLGER. Yes; largely.

Senator CHANDLER. Under the first contract?

Mr. FOLGER. Largely. Secretary Tracy and I arranged it together.

Senator CHANDLER. Did not the first contract provide that the application of the Harvey process to plates should be supervised by the inventor himself at the Bethlehem Works?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Did the Bethlehem Company refuse to allow him so to supervise?

Mr. FOLGER. They would not allow him or his agents to be present during the treatment of contract plates. They would allow him to visit *the works, but* they would not allow him to keep his men there.

Senator CHANDLER. They absolutely refused to allow the process to be applied under his direction?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. That made a new contract necessary?

Mr. FOLGER. That made a new contract necessary.

Senator CHANDLER. Did you not arrange the details of the new contract?

Mr. FOLGER. The new contract was the abrogation of the old one, which took place after I left the Department.

Senator CHANDLER. Did you not have anything to do with the terms of the contract that was executed by Secretary Herbert in April, shortly after he came into the Department?

Mr. FOLGER. I had absolutely nothing to do with it.

Senator CHANDLER. You had nothing to do with arranging that contract?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Did you not explain the terms to Mr. Secretary Tracy and Secretary Herbert?

Mr. FOLGER. I probably talked to them about it, and they said what they would do, but I had nothing to do with arranging the terms or making out the scheme of procedure.

Senator CHANDLER. Who explained to Secretary Herbert the second contract?

Mr. FOLGER. I think more than likely Captain Sampson did. He was then Chief of Ordnance.

Senator CHANDLER. You were then in the employ of the company?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. When did you go abroad?

Mr. FOLGER. On the 3d of June.

Senator CHANDLER. During the period when the second contract was being arranged and executed by Secretary Herbert, one of the first things he did after he went into office, you were in this country and employed by the Harvey Steel Company, but you had nothing to do with explaining the contract to the Secretary of the Navy; did you confer with Commander Sampson about it?

Mr. FOLGER. Yes, sir; at least I probably did; but the Department had determined already what terms it would make.

Senator CHANDLER. Have you any doubt that on the 1st day of January, 1893, or shortly thereafter, you went into conference with Commander Sampson and Secretary Tracy in reference to the new Harvey contract?

Mr. FOLGER. No, there is not much doubt about it—within ten days after the 1st. We had more or less talk about it, but Secretary Tracy had made up his mind at that time as to what he proposed to do.

Senator CHANDLER. As to the nature of the contract he would make?

Mr. FOLGER. As to the terms he proposed to allow them.

Senator CHANDLER. I wish to ask you to state—for it is material to this inquiry—what your general policy has been in reference to patents upon processes which would be useful to the Government.

Mr. FOLGER. Where it is likely that the Government may make a contract with the owner of the patent, I have always considered (although I do not remember requesting the expedition of any but this one patent; I may have asked for others, although I do not remember it; you may have a record of some others whose expedition I asked for, but I do not remember any others just at this moment) that it was wise *for the Government* to clear up any doubt as to the validity of a patent

as early as possible, as the fact of validity influences the character of the terms which the Government will make with the inventor.

Senator CHANDLER. I can understand that part of your policy, but now as to the policy of encouraging the taking out of patents by Government officers.

Mr. FOLGER. I have done that in one or two cases. There was the instance of Mr. Fletcher, when the Government saved, I believe, a half million dollars in the cost of the mounts used for rapid-fire guns. Mr. Maxim claimed to have a patent that covered everything which we had developed, and I had fortunately taken advantage of that clause in the Patent Office regulations which permits an officer to take out a patent free of expense. I had Mr. Fletcher's device protected, and when Mr. Maxim came to Washington and almost persuaded Secretary Tracy that he was entitled to remuneration, I was enabled to present Mr. Fletcher's patent and modify Secretary Tracy's impression as to the claim of other inventors.

Senator CHANDLER. You had encouraged Mr. Fletcher, who was then a naval officer connected with the Ordnance Bureau, to take out a patent in advance of Maxim?

Mr. FOLGER. Yes; in advance, however, of any knowledge of Mr. Maxim's patent, for the purpose of protecting the Government. Mr. Fletcher received no royalty for that.

Senator HALE. The design or invention or thought was really Fletcher's?

Mr. FOLGER. It was entirely Fletcher's.

Senator CHANDLER. What was the interest of other inventors if it was Fletcher's?

Mr. FOLGER. You know inventors differ as to whether each other's ideas are novel. The Government has been unfortunate in more cases than one of this kind. Men go down to the Washington Navy-Yard, notice a little device which we have used there for years, and return and take a patent out and present a claim, and secure the services of influential friends to advocate it.

Senator CHANDLER. Your policy was to have some Government officer take out the patent and give a license to the Government?

Mr. FOLGER. Yes.

Senator CHANDLER. Was that the case with Fletcher's patent?

Mr. FOLGER. That was the case with Fletcher's patent.

Senator CHANDLER. Give Fletcher's full name and state what his invention was.

Mr. FOLGER. F. F. Fletcher; improved mount for rapid-fire guns. I think that is the only patent he took out.

Senator CHANDLER. Did you make an arrangement with him that the Government should pay him something?

Mr. FOLGER. No, sir.

Senator CHANDLER. Has Secretary Herbert agreed to pay Fletcher anything for any patent?

Mr. FOLGER. No, sir.

Senator CHANDLER. Nothing whatever?

Mr. FOLGER. Nothing whatever. You may refer to the Dashiell patent.

Senator CHANDLER. No; I refer to the Fletcher patent.

Mr. FOLGER. Where the officers who made discoveries and inventions that were useful to the Government were employed in the Bureau, I did *not consider* that they were entitled to any remuneration.

Senator HALE. You caused patents to be taken out for their inventions?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. I have here, and intend to put into the record hereafter, the testimony of Mr. Samuel Seabury and of yourself in the suit of Seabury et al. *v.* Dashiell. On page 88 of the record of that case on appeal I read from your testimony a statement like that which you have already made here:

> Mr. Maxim, a great inventor, came to me and stated that we were using an invention of his, and he would make us pay $500 apiece for every one of them we used. I was quite convinced that he was wrong. I had suggested to one of my assistants, previous to this statement of Mr. Maxim's, that he take out a patent to protect the United States. This is a case where the patentee gives the United States the use of his device. By a curious set of circumstances, Mr. Maxim arrived at the Department and made claim on the Secretary of the Navy that we were using his device, and I was enabled, by the arrival that morning from the Patent Office of a notice to Mr. Fletcher, to meet his statement to the Secretary of the Navy and to present the paper, which cleared the atmosphere entirely. Mr. Maxim was knocked out, of court, and never made any claim whatever after that time. We were making and have made hundreds of the Fletcher mechanisms precisely in the same way.

That statement you then made expresses your policy in the Department?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Was that the policy that you carried out in this case in inducing Dashiell to procure a patent that should, to use your own expression, knock out the Seabury patent?

Mr. FOLGER. The cases were different. Mr. Dashiell at that time was not in the Ordnance Bureau, but was stationed at the proving ground at Annapolis. He had not received from me any instructions to get up a breech mechanism. I was at a loss at that time to secure an efficient breech mechanism for rapid-fire guns. I did not know at that time that he was working upon such a device at the proving ground, but it seems that he had had made a small model of a breech mechanism for a rapid-fire gun, and he brought it to me at the Department. He had done this without having been instructed to do so by me, and he was not employed at that time under instructions by the Department for the development of machinery for ordnance. So he was in a different position from Mr. Fletcher, who has constantly given directions and engaged in discussions concerning and employed in such work. I was so much pleased, however, with his (Dashiell's) mechanism, and with the fact that we would attain what we wanted for half the sum mentioned in the original Seabury negotiations, that I was willing that he should take out a patent in his own name, he paying the expenses therefor himself.

Senator CHANDLER. Did you ever suggest to Dashiell to go in and endeavor to anticipate the Seabury device?

Mr. FOLGER. Not at all. I never saw the Seabury device or drawings but during an interview of perhaps a half hour. When Dashiell came to me and presented his mechanism some time later I could not have described the Seabury mechanism; I had forgotten it entirely. I did not dream that it was any infringement. The idea I had was that it was very much more simple, and apparently very much more effective, than the invention produced by Seabury some months previous. I did not imagine that the two were in conflict, and I did not urge him to take out a patent for any such reason.

Senator CHANDLER. You continue the statement that you made in the lawsuit referred to, that you did not encourage Dashiell to make his invention of a breech mechanism in order to anticipate Seabury?

Mr. FOLGER. Yes.

Senator CHANDLER. I now read from page 71 of this same rec

Q. If you had already seen the Dashiell device, you did not mention tha Seabury?—A. I would not have been apt to mention it. I will tell you o which may be of interest to you. Mr. Seabury has taken out a great many and has been several times offered duty in the Bureau of Ordnance. He ha declined it. If some other device had come before me as chief of bureau, pathetic consideration would be with the other, naturally, if the merits of t device at all made such a decision justifiable, on account of Mr. Seabury ne ing been willing to work in the Bureau of Ordnance.

You made that statement?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. That represents your policy?

Mr. FOLGER. Yes.

Senator CHANDLER. On pages 72 and 73 I read a few questi answers:

Q. You recommended him to do it?—A. I told him I hoped he would ta patent.

Q. You think he was wise and right in taking such a course?—A. Yes, s that certain officers have served the Government of the United States to extent that the Government should pay them in one way or another. The not sufficient, and they can not make any money in the service. When th without order or instruction from me as to the evolution and development of produces a thing which the Patent Office states is original in idea, and wh my opinion, different from and better than anything that has been present I say to that officer, "Take out a patent, because your services have bee that you should receive some remuneration for them." That is the case that is why this officer had my sympathetic consideration all through; bu had only that, however.

Q. On principle, you are ordinarily prejudiced against an officer who tak patent for his invention?—A. On general principle, in the case of an officer not given services to the United States, I am opposed to their taking out I myself have never taken out a patent of any description, and I have proba connected with the Ordnance Department more intimately than any other the Navy at the present time, not excluding my predecessor. When an offi on duty it is quite another matter. When an officer is on duty, I depr taking out a patent; but there are certain cases where an officer's services l of such a nature that the Government can not reward him. When his serv been very great and of a meritorious character, then I want to see him rec remuneration, on general principles of equity. I tell you frankly, and i human, that I look upon the production of that officer with more sympath sideration than I do upon the production of an outsider and free lance, w in for the pelf alone, for mere money-making business, without having g previous service, remembering all the time that the interests of the Govern guarded by the adoption of the better device. I am thoroughly convinc iell's is a better device.

Does that represent your views?

Mr. FOLGER. That represents my views at the present time.

Senator CHANDLER. In this case Dashiell went on and patent?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. And Seabury brought suit against him fringement. It was decided by a single judge, Judge Morris, i land, that Dashiell's device was a mere variation from Seabury's and he issued an injunction. On appeal to the circuit court of that decision was reversed on two grounds, first, that the ment ought not to be enjoined when engaged in making war n on account of any patent whatever, whether valid or not; and se on the ground that the original bill had charged fraud, and n had been proved. Is that the case as you understand it?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. And the case is appealed to the Supreme of the United States?

Mr. FOLGER. Yes, sir. I believe the decision has not been handed down by the Supreme Court.

Senator CHANDLER. Has the case been argued and submitted?

Mr. FOLGER. It has been argued and submitted.

Senator CHANDLER. Following out this policy, what was the result of Mr. Dashiell's invention, so far as the Navy Department was concerned? Did he give the device to the Navy Department?

Mr. FOLGER. No; he contracted with the Navy Department to receive $100 per mechanism.

Senator CHANDLER. It was $125.

Mr. FOLGER. Then it was one-half of $250, as provided in the case of Seabury?

Senator CHANDLER. It was $125 per mount. Who made that contract with Dashiell?

Mr. FOLGER. I believe the Bureau of Ordnance made it, with the approval of the Secretary of the Navy.

Senator CHANDLER. When you were there?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. So that this invention by Dashiell, which had been based on Seabury's, if it was anything like that, resulted in a contract with Dashiell for $125 a mount?

Mr. FOLGER. Yes; but it was not based upon Seabury's.

Senator CHANDLER. I want to contrast your action in this case, where you desired to protect the Government, and yet where Dashiell got a contract for $125 a mount, with your action in the Harvey case, where you encouraged Harvey, who was an outsider, to go on and apply his process, and aided him in getting a patent, and helped him to make a contract with the United States for compensation for the use of that patent. Was your action consistent in the two cases?

Mr. FOLGER. I think it was entirely so.

Senator CHANDLER. Explain.

Mr. FOLGER. There are good inventors and bad inventors. When I took up the Harvey-plate matter I did not know the process by which he attained what was to me a new and entirely surprising result. It was a bona fide case of American invention. We are generally accused of not permitting inventors to have any consideration by the Department. The old complaint has no doubt been frequently brought to your ears that no one can secure the adoption of a device by any of the Government Departments unless the inventor be an officer of the Army or Navy; that the devices of military officers receive more consideration than those of others. There are, however, exceptions to this rule. Mr. Harvey seemed to me to have a bona fide meritorious invention.

Senator CHANDLER. Do you not think it would have been more consistent with your line of action in the Seabury-Dashiell case, if you thought the Harvey hardening process could be applied to armor plate, to suggest to him that you did not want to take out a patent than to suggest to some naval officer to make an investigation and take out this patent for the protection of the Government, as you claim was your motive in the Seabury-Dashiell case?

Mr. FOLGER. I want to recall to you that I make a distinction. Harvey already had a patent on a process for carburization which was to me new and surprising, and I, not knowing the terms of his armor-plate patent or the method of his process, believed that this was a meritorious novelty discovered by an outsider.

Senator HALE. Was it not an absolutely new invention, one of such novelty and *vast importance* that nobody in the Department had experimented *with anything* of the kind?

Mr. FOLGER. I took the thing to Commodore Sicard, who——

Senator HALE. Was it not so new that the officials of the Department would have refused to have anything to do with it?

Mr. FOLGER. As a matter of fact I think nobody would have touched it in the manner you imply.

Senator HALE. I do not understand you to say that when a new invention was presented to you, you went out and hunted up naval officers to procure a patent upon it.

Mr. FOLGER. Oh, no.

Senator HALE. I do not understand you to say that.

Mr. FOLGER. I do not wish to be quoted as saying that when people brought in inventions we sought to have naval officers take out patents upon them.

Senator HALE. I should think that would be undue interference.

Mr. FOLGER. It would be.

Senator HALE. That would not be treating an inventor right.

Mr. FOLGER. It certainly would not. This Harvey matter, to my mind, was a revolution in armor.

Senator HALE. And a revelation, too?

Mr. FOLGER. And a revelation. It was something entirely different and new. It realized in a manner which had not been fully attained an ideal that I had dreamed of for ten or fifteen years.

Senator CHANDLER. You say he brought you hardened steel. In your first conferences with him did he describe his process or inform you what his patent was?

Mr. FOLGER. No.

Senator CHANDLER. Did you not know that the hardening was secured by carbonizing, by burning charcoal of bone against the surface?

Mr. FOLGER. No; I did not know how it was done, except in a very general way.

Senator CHANDLER. Did you not look at the patent in order to ascertain?

Mr. FOLGER. I never saw the patent.

Senator CHANDLER. You did not go to the Patent Office and look it up?

Mr. FOLGER. No.

Senator CHANDLER. At the time you made the arrangement with him to expedite his patent, you did not know that his original application had been rejected by the Patent Office?

Mr. FOLGER. I did not even know the terms of his second patent. I knew he had a patent, and I let it go at that.

Senator CHANDLER. You encouraged him to make an application, and procured the Secretary of the Navy to request an expedition of the issuance of that patent, without any knowledge on your part that a few weeks before the Patent Office had rejected the whole thing?

Mr. FOLGER. I did not know that at all.

Senator CHANDLER. What do you now understand the Harvey process to be?

Mr. FOLGER. I understand it to be the inclosing of a plate protected on one side with some inert matter like sand to prevent carburization, while on the other side it is packed in bone dust, powdered charcoal, and perhaps other substances—I do not know what—making a mixture which, when inclosed and kept from the heating flame of the furnace surrounding it, turns this carbonized mixture into gaseous carbon—carbonic oxide and carbonic acid. The outside of the furnace surrounding

heated to a very high temperature, greater, it is claimed, than the ting point of cast iron. It is kept in this state for number of days he case of a large mass, as an armor plate, and the gaseous carbon neates the nonprotected side of the plate to a varying depth, depend- upon the time of exposure and the temperature as well as upon the lity of the carbonaceous mixture surrounding it. It is not a fixed nce, by any means. We had many failures at first, where the car- aceous material was not thoroughly impregnated and thoroughly form. At Bethlehem and at the Carnegie Works they are now get- g that down to such a point that they can nearly depend upon attain- a uniform result. While I was connected with the Harvey Company re was suggested the use of an incorporating mill for mixing this rbonaceous material, and the later results showed an improvement.

Senator CHANDLER. Briefly, it is the burning of carbon against the rface of the plate to be hardened, is it not?

Mr. FOLGER. It is the result of heating highly charged carbonaceous as under a certain amount of pressure (oxygen and other elements of e air being excluded from contact with the plate, as their presence oduces a disadvantageous blistering effect) in contact with low steel.

Senator CHANDLER. When the plate is put into the Harvey furnace, elow it a large quantity of charcoal of bone is placed, is it not?

Mr. FOLGER. Yes.

Senator CHANDLER. The gas is blown through that, and the heat ept up affects the surface of the plate?

Mr. FOLGER. The heat is kept up, turning the carbonaceous material nto gas. The weight of the plate also assists in the impregnation.

Senator CHANDLER. And after being heated to the maximum and after handling, the surface is found to be chilled?

Mr. FOLGER. The addition of carbon renders it possible to harden it by chilling. Before that it would not harden, not having a suffi- cient quantity of carbon.

Senator CHANDLER. And the chilling is done later?

Mr. FOLGER. It was intended at first to do this with the carbonizing heat, but they later found it more expedient to place it in the chilling apparatus after heating it a second time.

Senator CHANDLER. To what extent does the Harveyizing process extend into the plate?

Mr. FOLGER. We have chemically analyzed both sides of a plate, and on the Harveyized surface we have found new carbon to a depth of an inch and a half, in a gradually decreasing amount.

Senator CHANDLER. When the plate is worked up to be put on a ship this lower stratum has to be specially handled because it is so hard?

Mr. FOLGER. In order to produce holes for use in riveting on the structural parts of the ship it is necessary to apply a blowpipe or an electric light.

Senator CHANDLER. To soften or melt it?

Mr. FOLGER. An incandescent light to soften it. Holes can then be bored in it.

Senator CHANDLER. I give another illustration: Where a plate has been made by ordinary tools until it gets down to the edge, then the edge has to be ground off by the emery wheel.

Mr. FOLGER. If the plate has been tempered it has to be ground off.

Senator CHANDLER. I will ask you whether it is a necessary part of the Harvey process to put charcoal under the plate through which the gas is blown?

Mr. FOLGER. Yes; but the furnace was at first so constructed that the plate was bedded in sand, and the carbon was applied to the upper side. Then Mr. Harvey suggested that the weight of the plate would produce an additional pressure and perhaps assist to convey the carbon to a greater depth, which is the object sought. I do not know personally, because I have not been for so long engaged upon it, whether they do not now in England, and perhaps in some cases in this country, apply the carbon upon the upper side. It depends upon how the furnace is constructed.

Senator CHANDLER. Can you say that at the Carnegie works they do not simply heat the lower surface by carbonized gas, without putting any bone charcoal under the plate?

Mr. FOLGER. Oh, no; I know they do that.

Senator CHANDLER. Are you sure they put charcoal under the plate?

Mr. FOLGER. Yes, sir.

Senator CHANDLER. Are you, or are you not aware that it is claimed that this carbonizing process can be applied through gas alone, without any charcoal?

Mr. FOLGER. Yes, sir. Mr. Harvey used to discuss that method, and at one time was thinking of making that sort of an application. Krupp, I am told, has applied gas in plate manufacture. I do not know of my own knowledge whether Carnegie applied that feature or not, but I think not.

Senator CHANDLER. Is it not true, as a matter of fact, that in Europe, and also at the Carnegie works in this country, they do not carbonize the face of the plate the same way that it has been done at Bethlehem under the Harvey process?

Mr. FOLGER. You have thrown doubt upon it, but up to this time I have believed that the Carnegie works used the carbonaceous material in the same manner as at Bethlehem.

Senator CHANDLER. I do throw a doubt upon it as to whether the manufacturers in England or in this country harden their plates to-day by any use of the Harvey process, notwithstanding they have purchased the patent. I have reason to think they do not.

Senator SMITH. Are you familiar with the manufacture of armor plate?

Mr. FOLGER. In a general way. I have been connected with the development of armor plate in this country, but not with the manufacturing and producing details. I have been working in the interest of the Government as an official.

Senator SMITH. You know the present prices paid per ton by the Government for the armor plate?

Mr. FOLGER. I know the average price; that is about $550 per ton.

Senator SMITH. Have you any opinion or knowledge that would be of any benefit to this committee to give them an idea of what the probable cost is of manufacturing armor plate?

Mr. FOLGER. I think the cost of production of armor plate is much less than the Government has been charged for it. I think, however, that the cost should not be taken alone as a measure of the price that we should pay. Although we have never thrown back upon their hands a lot of armor plate, yet there is a certain risk involved all the time that they may have armor plate thrown back upon their hands, through failure to pass contract tests, and no doubt that feature enters into the calculations and enhances the price somewhat. I must say, though, *that the price is* still large.

Senator SMITH. What, in your opinion, is the cost of manufacturing *armor plate?*

Mr. FOLGER. It is very difficult to state this, because the contracts for material are so large and there are so many elements entering into the question; but I should say that from $250 to $300 a ton would represent the cost.

Senator SMITH. Would it be practicable, and if so, what, in your judgment, would it cost the Government to erect a plant alongside the Cambria works and in connection with those works for the manufacture of armor plate?

Mr. FOLGER. It would be perfectly practicable. The question is, Could the Government employ its plant at times when there would be no demand for armor plates; and would there not be a deterioration, speaking economically, in allowing the plant to remain idle? There is no doubt in my mind that if the Government chose to go into the manufacture of steel of all varieties, other parties furnishing the raw material, it could be done.

Senator SMITH. Would it not be practicable for the Government to purchase its steel from the Cambria people ready to be treated for armor-plate work?

Mr. FOLGER. In ingots, you mean?

Senator SMITH. In ingots.

Mr. FOLGER. I see no manufacturing difficulty in the way.

Senator SMITH. Have you made any figures as to what the probable cost would be for putting in the additional necessary machinery for such work?

Mr. FOLGER. No, I have never made any such calculation; I have watched the discussions in Congress with a great deal of interest, but I think the outlay would be larger than the original statement of $2,000,000. I think that you would have to employ steadily high-class talent, and such talent as would be necessary could command higher salaries than are paid in the Navy. I think the success of such a venture would be problematical for that reason.

Senator SMITH. Have you heard it intimated, or do you know, that there is a combination, or agreement, or understanding among the manufacturers of armor plate on the other side of the water?

Mr. FOLGER. I have heard it intimated that they have on the other side endeavored to combine so as to control prices, and to allow only a certain amount of output from each one.

Senator SMITH. It is generally understood, is it not, that they have combined or agreed upon prices?

Mr. FOLGER. I think it is. I do not know that my information is authentic, but that has been talked up among armor-plate people.

Senator SMITH. Do you know that there is any understanding between the Carnegie people and the Bethlehem people as to the price?

Mr. FOLGER. I think, without knowing, that there has been an understanding in the bids that have been made.

Senator SMITH. Believing as you do, and as some of us do, that there is a combination of armor-plate manufacturers on the Continent, that there is a combination in this country, and that we are paying very high prices—at least a hundred per cent profit to these people—what, in your judgment, would be the best way for the Government to get its armor plate at a reasonably fair cost? If this matter were referred to you, what would you suggest as the best thing for the Government to do?

Mr. FOLGER. I would suggest developing other sources of production. I would endeavor to have contracts made stipulating that no combinations should be lawful. I do not know whether that is possible.

Senator SMITH. You would suggest the enactment of a law making combinations unlawful?

Mr. FOLGER. I do not know whether you can do that, but at any rate I would suggest the development of other sources of production.

Senator HALE. Are there other plants in the country that could be brought to a condition where they could make these plates?

Mr. FOLGER. I understand that the Carbon Iron Company of Pittsburg can manufacture plates up to 8 inches in thickness. I think the Government will have bids from that company the next time. The Cambria people would quickly become producers of at least a portion of this plate. The suggestion was made a while ago in regard to the production of ingots which might be applied to the manufacture of plates, and contracts might be offered to the Midvale and other works that could undertake such work.

Senator CHANDLER. I will now put into the record, in the order named, the following documents:

English patent No. 278, of 1888, to Claud Thornton Cayley and Reuben Samuel Courtman, for improvements relating to the manufacture of projectiles or shells and to apparatus therefor.

United States patent No. 447229, dated February 24, 1891, to Claud Thornton Cayley and Reuben Samuel Courtman, of London, England, for shells.

Part of record in the case of James B. M. Grosvenor, Lavinia Wilson, Edward H. Litchfield, and Samuel Seabury, appellees, *v.* Robert B. Dashiell, appellant, in equity, on appeal from the circuit court of the United States for the district of Maryland to the United States circuit court of appeals for the fourth circuit.

No. 278. SPECIFICATION OF CLAUD THORNTON CAYLEY AND REUBEN SAMUEL COURTMAN.

Improvements relating to the manufacture of projectiles or shells and to apparatus therefor.

[Date of application, January 6, 1888. Complete left, May 18, 1888. Complete accepted, June 29, 1888.]

PROVISIONAL SPECIFICATION.

IMPROVEMENTS RELATING TO THE MANUFACTURE OF PROJECTILES OR SHELLS AND TO APPARATUS THEREFOR.

[Diagrams omitted.]

We, Claud Thornton Cayley, engineer, and Reuben Samuel Courtman, engineer, both of Acre street, New Road, Wandsworth Road, in the county of Surrey, do hereby declare the nature of this invention to be as follows:

Our invention relates to the manufacture of hollow projectiles or shells and to improved apparatus to be used in such manufacture.

In the specification of letters patent granted to us and dated December 24, A. D. 1886, No. 16943, we have described a method of manufacturing a hollow projectile from a solid projectile or from a solid block or piece of metal of the same, or approximately the same diameter and shape or configuration as the finished projectile. This method comprises the formation of the central chamber or cavity by driving punches or mandrels into the said block or piece while confined in a die or mold fitting around the same so that the metal displaced from the center by the said punches is compelled to flow or expand endwise.

In making a hollow projectile or shell according to one part of our

present invention, we take a solid block or piece of steel or iron of slightly greater weight than that which it is desired the projectile should have when finished, and of the shape or configuration hereinafter described, that is to say, the main portion of the said block or piece is slightly conical or taper and is considerably larger in diameter than the finished projectile or shell; the smaller end of the said block or piece is tapered to the same or approximately the same diameter as the base of the finished projectile. We heat this block or piece and place it in a supporting die or mold, and we form a cavity in the said block or piece by driving one or more punches or mandrels into the larger end thereof and thereby causing the metal to flow or expand endwise around the mandrel. This part of the process, however, is not intended to cause endwise flow of the metal to such an extent as to make the walls of the projectile or shell of approximately the required length, thickness, and diameter, the cavity formed being simply designed to afford an entrance for a supporting mandrel hereinafter mentioned, the required thickness of metal being left at the lower end of the block or piece for the base of the projectile.

The walls of the hollow block thus formed are much shorter and thicker than those of the finished projectile.

To elongate the said walls and reduce their diameter and thickness, we place the said block upon a mandrel and force or draw it, by means of a hydraulic press or otherwise, through a ring or die, or successively through two or more rings or dies of different internal diameter, the said block being reheated as often as may be required.

We then close the open end of the partially made shell, leaving an aperture at the apex for introducing the bursting charge and the fuse.

According to a modification of our present invention we proceed as follows, that is to say: We first take a solid cylindrical block of metal of the required dimensions and place the said block in a die or mold which will prevent lateral expansion of the said block or enlargement of its diameter; we then form in the said block, by means of punches or mandrels, a chamber or cavity of the required size and shape or configuration; and we then impart the desired external form or configuration to the said block by rolling it in the manner described in the specification of letters patent granted to G. F. Simonds and dated December 12, A. D. 1885, No. 15299, by means of dies such as those described in the specifications of letters patent granted to said G. F. Simonds and dated June 9, A. D. 1885, No. 7028, and January 9, A. D. 1886, No. 396. We prefer to place the said block upon a mandrel before subjecting it to the rolling operation, to prevent deformation of the chamber or cavity within it.

In our said former specification we have described a method of drawing hollow projectiles or shells to reduce the thickness of their walls or to make them parallel or cylindrical. For this purpose, as stated in our said former specification, we sometimes force the base only of the projectile or shell through a die by means of a mandrel and then draw or force the said projectile or shell by other means completely through the die while the mandrel is held stationary therein, so that the walls of the projectile or shell are drawn between the said mandrel and the die.

Our present invention comprises improved apparatus whereby we are enabled very advantageously to draw projectiles or shells in this manner.

In our improved apparatus we employ a tubular mandrel and a ram or piston fitted to slide longitudinally therein. The partially made hollow projectile or shell is placed upon the said mandrel and ram, which are then moved by hydraulic or other power until the base of the said

projectile or shell has passed through the die and an enlargement at or near the extremity of the mandrel arrives opposite or within the part of the die of smallest diameter; the mandrel is then held stationary while the movement of the ram or piston is continued so that the said ram forces the projectile or shell completely through the die. By these means we provide for stripping the projectile or shell off the mandrel while making the walls of the projectile or shell truly parallel or cylindrical, and, at the same time, insuring uniformity in the thickness of the said walls. We thus obviate the disadvantages arising from the use of a taper mandrel, as in some of the methods heretofore practiced, which necessitates the formation of a taper chamber or cavity within the projectile or shell. These means are, moreover, applicable for drawing partially made projectiles or shells for the purpose of reducing the thickness of their walls, whether the said projectiles or shells, previous to such reduction, are of conical or cylindrical form.

Dated this 6th day of January, 1888.

HASELTINE, LAKE & Co.,
45 Southampton Buildings, London, Agents for the Applicants.

COMPLETE SPECIFICATION.

IMPROVEMENTS RELATING TO THE MANUFACTURE OF PROJECTILES OR SHELLS AND TO APPARATUS THEREFOR.

We, Claud Thornton Cayley, engineer, and Reuben Samuel Courtman, engineer, both of Acre street, New Road, Wandsworth Road, in the county of Surrey, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

Our invention relates to the manufacture of hollow projectiles or shells, and to apparatus for use in such manufacture.

In the specification of former letters patent granted to us and dated 24th December, A. D. 1886, No. 16943, we have described the manufacture of hollow projectiles or shells by driving punches or mandrels into a solid rock or piece of metal while it is confined in a die or mould which prevents enlargement of its diameter and compels the metal displaced from the centre by the punches to flow or expand endwise.

Our present invention comprises various improvements which are based upon the invention described in our said former specification.

According to one method of manufacture described in our said former specification, we take a block or piece of metal of approximately the form of a truncated cone, and we drive punches or mandrels into the said block or piece while it is held in a supporting die or mould, thereby displacing the metal from the centre of the said block and compelling it to flow endwise in the space around the punch or mandrel until the wall of the hollow block—that is to say, the metal around the cavity thus formed in the block—is of approximately the required length and thickness. We thus produce a hollow conical or cup-shaped body which we force or draw through a die or dies to make it parallel or cylindrical.

In making a hollow projectile or shell according to one part of our present invention, we commence operations as above described—that is to say, we take a solid block or piece of metal of slightly greater weight than that which it is desired the projectile should have when finished, and of the shape or configuration hereinafter described, and we heat this block or piece and place it in a supporting die or mould and form *a cavity in the* said block or piece by driving punches or mandrels into *the larger end* thereof, and thus causing the metal to flow or expand

endwise in the space around the mandrel. In this manner we provide an entrance for a supporting mandrel, as and for the purpose hereinafter specified, and we reduce the metal at the end of the cavity to the thickness required for the base of the projectile or shell. This part of our improved method or process, however, is not intended to cause endwise flow of the metal to such an extent as to make the wall of the projectile or shell of the required length and thickness as described in our said former specification.

The wall of the hollow block as formed by this part of our process is much shorter and thicker than in the finished projectile.

To elongate the said wall and reduce its diameter and thickness, we place the said block upon a mandrel and draw it, by means of a hydraulic press or otherwise, through an annular die or ring, or successively through two or more of such dies or rings of different internal diameter, the said block being reheated as often as may be required.

We then close the open end of the partially made shell, leaving an aperture at the apex for the introduction of the bursting charge and the fuse.

In the accompanying drawings—

Figures 1, 2, and 3 are sectional elevations illustrating different steps or stages in the manufacture of a hollow projectile or shell according to this part of our invention.

Figure 4 is a longitudinal central section illustrating improved apparatus for drawing the hollow blocks as hereinafter described, the ram hereinafter referred to being shown in side elevation.

Figure 5 is a longitudinal central section of a projectile or shell manufactured as hereinafter described.

Like letters indicate corresponding parts throughout the drawings.

A is a block or piece of metal which is to be converted into a hollow projectile or shell. The lower part of this block is taper or conical, the diameter of its lower end being the same as or slightly greater than that of the base of the projectile or shell when finished. The upper or main portion of the said block is of considerably larger diameter than the base of the projectile or shell when finished; it may be cylindrical if desired; we prefer, however, to make it slightly conical, its diameter being larger at its upper than at its lower end.

The supporting die or mould *a* consists of a solid piece of metal in which is bored a hole or cavity of the requisite size and shape or configuration to receive and support the block A, and a cylindrical hole is bored through the bottom of the die or mould, into which is accurately fitted a solid metal cylinder *b*. The said die or mould and the cylinder *b* are supported upon a bed or anvil *c*.

d is the punch or mandrel which is to be driven into the block A, by hammering or otherwise, to form the recess or cavity therein, and which is formed with a shoulder *d** for the purpose hereinafter explained.

The block A, when placed in the die or mould, rests upon the metal piece *b* as shown in Figures 1 and 2, its lower taper end fitting in a taper portion of the hole or cavity in the said die or mould, and its upper or main portion, which is, as above stated, preferably slightly conical, fitting in a correspondingly shaped portion of the said hole or cavity. The punch or mandrel *d* is made with a cylindrical portion which fits into the upper cylindrical portion of the hole or cavity in the die or mould, so that the said punch or mandrel will be guided in its downward movement when driven into the block A.

The block A and punch or mandrel *d* having been placed in the die

or mould as shown in Figure 1, the said punch or mandrel is driven into the said block, the metal of which is thus displaced from the centre and caused to flow endwise into the annular space around the punch or mandrel until the shoulder d^* of the said punch or mandrel comes in contact with the upper surface of the said block, as shown in Figure 2. The punch or mandrel d is then withdrawn from the block A and from the die or mould.

The hollow body produced as above described is removed from the die or mould and is reheated and drawn to elongate its wall and reduce the thickness and diameter thereof. This operation is effected by forcing the said hollow body by means of a punch d^1 through an annular die or ring such as that shown at e in Figure 3, or successively through two or more of such dies or rings by means of punches, the annular space between each ring and punch being less in each successive operation, the internal diameter of the die or ring through which the partially made projectile or shell is to be finally forced or drawn being equal, or nearly equal, to the external diameter of the finished projectile or shell.

The open end of the partially made projectile or shell is then closed, or partially closed, as described in our said former specification, or in any other convenient manner.

A projectile or shell having the shape or configuration shown in figure 5 is thus produced.

It is obvious that the supporting die or mould may, if desired, be made in two pieces, or otherwise suitably constructed. Also that one or any other suitable number of punches or mandrels may be used in the formation of the cavity in the metal block, as above described.

In drawing the hollow body produced by means of the punches or mandrels as above described through the annular dies or rings, we prefer that, as soon as the base of the projectile has entered or passed a short distance through a die or ring, the mandrel should be held stationary, whilst the said hollow body is drawn, by other suitable means, completely through the said die or ring, so that the wall of the said hollow body will be drawn through the annular space between the said mandrel and the die, substantially as described in our said former specification.

Our present invention comprises improved apparatus whereby we are enabled to accomplish this result in a very advantageous manner. For this purpose we employ a tubular mandrel and a ram fitted to slide longitudinally therein. The said ram is preferably made with an enlargement or head of approximately the same diameter as the mandrel; we prefer, moreover, to make the said mandrel with an enlargement at or near its extremity and to form the die with a contracted part as hereinafter described. The hollow body is placed upon the said mandrel and ram, which are then moved by hydraulic or other power until the base of the said hollow body has passed through the contracted part of the die and the enlargement of the mandrel has arrived opposite or within the said contracted part of the die. The mandrel is then held stationary while the movement of the ram is continued, so that the said ram forces the hollow body completely through the die. By these means we provide for stripping the partially made projectile or shell off the mandrel whilst reducing its diameter and thinning and elongating its wall and making it truly parallel or cylindrical, and at the same time ensuring uniformity in the thickness of the said wall. We thus obviate the disadvantages arising from the use of a taper mandrel, as in some of the methods heretofore practised—that is to say, we

avoid the formation of a taper chamber or cavity within the projectile or shell. This apparatus is, moreover, applicable for drawing partially made projectiles or shells for the purpose of making the walls thereof parallel or cylindrical as described in our said former specification.

In figure 4 we have shown one form of our said apparatus; *f* is the ram, which is formed with a head f^1, and which is fitted to slide in a hollow mandrel *g* having an enlargement g^1. The said ram and mandrel are to be so connected with a hydraulic or other press that they may be moved simultaneously through a short distance and the movement of the mandrel may then be arrested while the ram continues to move. The die *e* is made with a contracted part e^1. In using this apparatus the hollow body is placed upon the mandrel *g* with its end or base against the enlarged end or head f^1 of the ram *f*, and is forced into the die or ring *e* by the simultaneous movement of the said ram and mandrel until the parts occupy the position shown; the movement of the mandrel is then arrested whilst the ram *f* continues to move and thus draws the hollow body through the annular space between the enlargement g^1 of the mandrel *g* and the contracted part e^1 of the die *e*.

We sometimes prefer to subject the hollow body to one or more drawing operations while hot, and then to one or more drawing operations when cold—that is to say, we draw the said hollow body successively through several annular dies or rings, reheating it before the first, and, in some instances, before one or more succeeding drawing operations, the subsequent drawing operation or operations being effected while the metal is cold. The metal is thus more effectually compressed or condensed than when reheated before all the successive drawing operations to which it is subjected.

We have shown a solid block A of the form which we prefer to employ in the manufacture of projectiles or shells according to our present invention. It is obvious, however, that blocks of somewhat different shape or configuration may be converted into hollow projectiles or shells by our improved method or process.

According to another modification of our invention we proceed as follows—that is to say: We take a solid cylinder of metal of the required dimensions and place the said cylinder in a die or mould which will prevent lateral expansion of the same or enlargement of its diameter; we then form in the said cylinder, by means of punches or mandrels in the manner above described, a chamber or cavity of the required size and shape or configuration; and we then roll the hollow cylinder thus produced in the manner described in the specification of letters patent granted to G. F. Simonds and dated December 12, A. D. 1885, No. 15299, by means of dies such as those described in the specifications of other letters patent granted to the said G. F. Simonds, viz: No. 7028, dated June 9, A. D. 1885, and No. 396, dated January 9, A. D. 1886; we thus produce a hollow projectile or shell having any desired external shape or configuration. We prefer to place the hollow cylinder upon a mandrel before subjecting it to the rolling operation, to prevent deformation of the chamber or cavity within it.

It is obvious that we can adapt our invention to the manufacture of armour-piercing projectiles or shells in which the aperture for the fuse is at the base instead of at the apex.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we wish it understood that we do not claim broadly or irrespectively of our improvements as herein set forth the manufacture of a hollow projectile or shell by driving punches or mandrels into a solid block, draw-

ing the hollow body thus produced through one or more annular dies or rings, and then closing or partially closing the open end thereof, as we have in our said former specification, No. 16943, already described and claimed such method of manufacture. But in the method described in our said former specification the hollow body formed by means of the punches or mandrels has its wall of the required thickness and length, and it is drawn through a die or dies merely for the purpose of making it parallel or cylindrical, and not, as in our present invention, for the purpose of elongating, reducing the diameter of, and thinning its wall. Moreover, we are aware that in the specification of letters patent granted to J. Baldie and dated March 5, A. D. 1885, No. 2932, a method of manufacturing hollow projectiles or shells is described which consists in casting a hollow body the wall whereof is of much greater thickness than is required in the finished shell, then inserting a mandrel in the said hollow body and reducing the thickness of its wall and increasing its length by forging it between swages and drawing it through an annular die or ring; we therefore make no claim to such method of manufacture; our present invention, however, differs from that of Baldie inasmuch as the solid block or piece is by our method of manufacture converted into a hollow projectile or shell entirely by forging, and the metal is therefore compressed and condensed so that the projectile or shell has greater strength than when made by drawing a hollow casting as described in Baldie's specification; and we claim:

First. The above-described method of forging a hollow projectile or shell—that is to say, by first driving punches or mandrels successively into a solid block or piece while it is confined in a die or mould as described in our said former specification and for the purpose hereinabove specified, then lengthening, reducing the diameter of, and thinning the wall of the hollow body thus produced by drawing it through one or more annular dies or rings substantially as hereinbefore described, leaving the end of the said hollow body open or closing or partially closing the open end thereof, as may be required.

Second. The modification of our method of manufacture, wherein we subject the hollow body to the action of the annular dies or rings whilst hot and also when cold, substantially as, and for the purpose, above specified.

Third. The employment, in combination with an annular die, of a tubular mandrel having a ram fitted to slide longitudinally therein and suitable means for moving the said ram and mandrel simultaneously through a short distance and for then holding the mandrel stationary while the movement of the ram is continued, substantially as and for the purpose set forth.

Fourth. The manufacture, substantially as set forth, of a hollow projectile or shell by driving punches or mandrels into one end of a solid metal cylinder to form therein a central chamber or cavity and then rolling the said cylinder between suitable dies, as and for the purpose specified.

Fifth. A projectile or shell manufactured substantially as hereinbefore described.

Dated this 16th day of April, 1888.

HASELTINE, LAKE & CO.,
45 Southampton Buildings, London, Agents for the Applicants.

UNITED STATES PATENT OFFICE.

Claud Thornton Cayley and Reuben Samuel Courtman, of London, England, assignors, by direct and mesne assignments, to the E. W. Bliss Company, limited, of Brooklyn, N. Y.

SHELL.

SPECIFICATION FORMING PART OF LETTERS PATENT NO. 447229, DATED FEBRUARY 24, 1891.

Application filed November 10, 1887. Serial No. 254805. (No model.)

[Diagrams omitted.]

To all whom it may concern:

Be it known that we, Claud Thornton Cayley and Reuben Samuel Courtman, subjects of the Queen of Great Britain, residing at London, England, have invented new and useful improvements in projectiles and shells, of which the following is a specification.

The present invention relates to hollow projectiles and shells for ordnance which are forged from a solid piece of iron or steel in contradistinction to being hollowed out by means of boring tools.

The object of this invention is to provide a peculiar projectile or shell with no joint or seam and possessing walls of substantially uniform thickness of great tenacity and strength; and to such ends the invention consists in a punch-forged hollow projectile or shell made of a single block of metal having a conoidal point and a longitudinally drawn and punched-out cylindrical portion formed with a lustrous external surface having parallel thread-like marks or lines extending longitudinally thereupon, whereby the article is distinguished from its kind now in the market.

We have in an application for patent filed February 12, 1887, serial No. 227419, fully described the process of manufacturing shells and projectiles from solid blocks of metal, and have also included or shown in said application the special forms of projectiles and shells claimed in the present application, which as articles of manufacture or products are not claimed therein.

In the accompanying drawings fig. 1 is a face view, partly in section, of a hollow armor-piercing projectile having a dense head. Fig. 2 is a longitudinal sectional view of a hollow shell having a fuse opening at the point and provided with a solid or closed base. Fig. 3 is a longitudinal sectional view showing a shrapnel shell charged with shot.

Referring to fig. 1, the reference numeral 1 designates the body portion of a projectile having a solid conoidal or conical point 2, which is made very dense or hard, so as to facilitate or insure the penetration of the projectile into solid armor plates. The base 3 of the projectile is shaped so as to leave a small central opening 4, that is closed by a screw plug or by any other suitable means. A chamber or cavity 4^a is formed within the body of the projectile for the purpose of throwing the center of gravity nearer the forward end than it would be if the projectile were solid.

The entire projectile defined by the foregoing description is made of a solid piece of steel or iron, and has no seams or joints whatever.

The process of manufacture is fully set forth in the application filed February 12, 1887, and, briefly stated, it may be said to consist in subjecting a solid block of metal to the action of punches, mandrels, and dies, so as to cause the metal to flow endwise and form a chamber or

cavity of any desired size or configuration. The open base of the projectile is then, by other dies, turned down so as to close it, with the exception of the small central opening 4. It should be observed that by the process of manufacture set forth we can manufacture very large and heavy shells or projectiles of one piece of steel or iron without the necessity of using boring tools. Furthermore, the successive action of punches and dies will improve the quality of the metal, produce walls of uniform thickness and great tenacity, and give great strength to the projectile, whether made with an open or closed bore. When the point or head is solid and closed, the metal will be very dense and hard, for the object already stated.

In fig. 2 we have shown a common shell which has a closed base 5, a body with parallel walls of uniform thickness, and a point formed by forcing the metal of said walls inward, so as to produce a conical or tapering head or apex, which has a central opening 8 for the reception of a closing plug. The shell shown in fig. 2 is made in the same manner as the armor-piercing projectile, only in this instance there is a fuse opening in the point. The shrapnel shell shown in fig. 3 is also forged from a single piece of steel, and before the open end or apex of the shell is closed we insert the diaphragm 10, which covers the chamber of the bursting charge. The aperture at the apex of the shell is made large enough to permit the introduction of the bullets or shot into the said shell after its end has been closed by the action of the dies, with the exception of said aperture. We prefer to fill the conical or conoidal part as well as the cylindrical part of the chamber or cavity in the shell. We then introduce the bursting charge and insert the fuse. In this manner we produce a forged shrapnel shell containing a larger number of bullets than a forged shrapnel shell of the same dimensions as heretofore manufactured, and we are enabled, if desired, to use steel instead of lead bullets, the larger number employed making up for the difference in the weight of the two metals. Moreover, we can by our improved method manufacture shrapnel shells more cheaply than is practicable by the well-known method of making them in two parts and uniting the said parts by riveting, screwing, or otherwise.

In addition to the projectile or shell having the characteristics of walls of substantially uniform thickness and great density, tenacity, and strength, our improved punch-forge projectile or shell possesses other characteristics by which it is distinguishable as an article of manufacture from prior projectiles or shells of its kind in that it possesses the characteristic features of a longitudinally drawn and punched out cylindrical portion formed with a lustrous external surface, having parallel thread-like marks or lines extending longitudinally thereupon, which are produced during the process of punching by the action of the die or mold and punches or mandrels and the lengthwise flowing of the metal.

We disclaim a hollow projectile rolled into shape with the metal condensed and hardened at one operation, as such is not our invention, and is disclosed by letters patent No. 348788 to G. F. Simonds, dated September 7, 1886.

What we claim as our invention is—

As a new article of manufacture, a punch-forged hollow projectile or shell having a conoidal point and a longitudinally drawn and punched out cylindrical portion formed with a lustrous external surface having parallel thread-like marks or lines extending longitudinally thereupon, *substantially* as herein set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

CLAUD THORNTON CAYLEY.
REUBEN SAMUEL COURTMAN.

Witnesses:
GEO. J. B. FRANKLIN,
WALTER J. SKERTEN,
Both of 17 Gracechurch Street, London, E. C.

In the United States circuit court of appeals for the fourth district.

JAMES B. M. GROSVENOR, LAVINIA WILSON, Edward H. Litchfield, and Samuel Seabury, appellees,
v.
ROBERT B. DASHIELL, APPELLANT.
} In equity.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF MARYLAND.

16 EXCHANGE PLACE,
New York City, October 18, 1892—11 a. m.

Present, Samuel A. Blatchford, esq., the commissioner; also Mr. William G. Wilson, of counsel for complainants, and Mr. S. F. Phillips, of counsel for the defendant.

Counsel for complainants produces and files with the commissioner and offers in evidence notice of taking testimony on behalf of the complainants, with proof of due service thereof, on the solicitor for the defendant.

Said notice and proof of service annexed are marked "Complainants' Exhibit. Notice of taking testimony. S. A. B., commissioner."

It is hereby consented that the testimony in the above case, under the notice given by the solicitors for the complainants for the taking of testimony in New York before Samuel A. Blatchford, may be taken down in the presence of said Samuel A. Blatchford by a stenographer and afterwards typewritten and subscribed by the witness.

SAMUEL SEABURY, called on behalf of the complainants, and being duly sworn, testifies as follows:

Direct examination by Mr. WILSON:

1. Q. You are one of the complainants in this cause, I believe?—A. I am.

2. Q. What is your age?—A. Forty-two.

3. Q. What is your residence?—A. Bayonne, N. J.

4. Q. Your occupation is what?—A. Lieutenant, United States naval officer; at present on furlough.

5. Q. How long have you been an officer of the Navy?—A. I graduated at the United States Naval Academy in 1871.

6. Q. You have been continuously in service?—A. Ever since until the middle of April last, when I was granted a furlough.

7. Q. Have you given any special attention to ordnance matters in the course of your experience?—A. Yes; ordnance has always been an interesting study to me, and in an unofficial way—a disconnected way—I have followed it for many years. I first attacked the breech-loading mechanism for guns about 1876.

8. Q. Since that time have you given thought and study to the subject?—A. Yes; very much, disconnectedly.

9. Q. During considerable of that time you were engaged in duties at sea?—A. At sea and on shore both, dividing the duties between sea and shore.

10. Q. Did you finally devise a breech-loading mechanism yourself and apply for a patent thereon?—A. Yes; I devised a breech-loading mechanism involving an interrupted screw block.

11. Q. And for that invention did you apply to the United States Patent Office for a patent?—A. I applied for a patent about July, 1889; as I recollect, it was the 19th it was filed.

12. Q. Was a patent subsequently granted on that application?—A. A patent was allowed upon this application in October, 1889. It was allowed in October, 1889, and allowed to run its six months before issue, which occurred on the 15th of April, 1890.

13. Q. Is this the patent you refer to?—A. Yes; No. 425584.

(Counsel for complainants offers a certified copy of the patent in evidence. It is marked Complainants' Exhibit, Letters Patent No. 425584.)

14. Q. Did you subsequently assign any interest in this patent to another person?—A. I did.

15. Q. To whom?—A. I assigned one-half interest to Lavinia Wilson, of New York City.

16. Q. Did she assign any part of that?—A. She assigned, as I understood, one-half of her interest to Mr. J. B. M. Grosvenor. I also assigned one-sixth of my remaining interest, or one-twelfth of the whole, to Mr. Edward H. Litchfield, of Brooklyn.

17. Q. After obtaining this patent what steps, if any, did you take with the view to the working of the patent in this country?—A. After the patent was allowed a working model was constructed—a model made one-half scale of the Navy 4-inch gun—and with this model I went to Washington in the early part of May, 1890, after the issue of the patent, accompanied by Capt. J. Wall Wilson, of New York, and together we visited the Bureau of Ordnance of the Navy and placed the model, together with a set of the then unfinished drawings of a modification of the mechanism, before Commodore Folger, Chief of the Bureau of Ordnance.

18. Q. You have those drawings now with you?—A. I have; yes.

19. Q. Please state what conversation occurred between you and Commodore Folger on that occasion.—A. Commodore Folger expressed himself as much interested in the model, seated himself at a table before it, opened and closed it a great many times and said, as if speaking to himself: "Yes; this is a very good thing—in many respects superior to anything we have," and then, after still further examination, he arose abruptly from his chair and said, "Well, what will you charge us for this?" Captain Wilson asked him if he meant a lump sum. He replied, "No, the Government does not do business that way; I mean a royalty." We explained to him that his question was rather sudden—that we were not prepared to answer it. Whereupon, he told us to talk it over together and let him know what we would agree to take. Captain Wilson and I concluded that——

20. Q. State what you said.—A. We agreed to take the amount the Department had agreed to pay the Driggs-Schroeder Company for the use of their block or their system. Commodore Folger thought that this sum was about $250 per gun, and verified his belief by the books of the Bureau, which were brought by Ensign Alger, now professor.

21. Q. Did the $250 apply to all sizes or to one particular size?—A. No; we intended it to apply to the 4-inch gun, which was the understanding we had with him.

22. Q. Do you mean a larger sum for a larger size?—A. That was our understanding.

23. Q. Was that talked of?—A. We mentioned pro rata for larger guns, but nothing definite.

23½. Q. But $250 for the 4 inch was understood as the basis?—A. That was our understanding.

24. Q. What further took place?—A. Commodore Folger then said in his own words, "Our fences are all up and in good condition; we have a good mechanism now—the Driggs-Schroeder, which will be tried shortly. I will hold this mechanism as an alternate for trial in case of the failure of the Driggs-Schroeder."

25. Q. Did that refer to any particular size of the Driggs-Schroeder—was it mentioned in the conversation?—A. It referred to the 4-inch Driggs-Schroeder which was then being prepared at the Washington yard for trial.

26. Q. Was there further conversation?—A. Yes; the conversation afterwards turned upon a new gas check which I wished to submit, and in which Commodore Folger seemed to take a good deal of interest, saying that, in a measure, he considered himself the inventor of this check. Before we left the office we made another effort toward getting the mechanism for the 4-inch gun tried without waiting for the Driggs-Schroeder, and finally Commodore Folger said to us, "Well, I will tell you what I will do, I will try this mechanism anyway," pointing to the drawing of the 4-inch gun—these are the very tracings that were unfinished at that time.

27. Q. These are the very tracings?—A. Yes; unfinished at the time. "Complete these drawings and send me blue prints of them," and then he turned to the drawing of the gas check saying, "There is no reason why we should not try this at once; make me drawings embodying the 6-inch gun with your mechanism, etc., and send them on."

28. Q. Which of these are the drawings, or are they all the drawings which you presented to Commodore Folger at the time mentioned [showing the witness some papers]?—A. These sheets were unfinished, marked 1 and 2.

29. Q. To what extent were these sheets 1 and 2 then finished?—A. Their outlines were finished, but there was no shading and some of the minor points of firing gear and trigger were not located—this pawl was afterwards placed in.

30. Q. Were the essential features of the mechanism as you understood them clearly shown by the drawing?—A. The essential features were fully set forth in the drawing.

31. Q. That is, the method for rotating the screw block, the method of withdrawing the block from the breech into the tray, and the method for swinging the block so withdrawn on the tray out of the way of the breech of the gun?—A. That is correct.

(Counsel for complainants offers these drawings in evidence. They are marked "Complainants' Exhibits Drawings 1 and 2," respectively.)

32. Q. After the interview which you have narrated, did you return to New York?—A. I did, at once.

33. Q. Were you then stationed at New York?—A. I was attached to the United States Naval Board of Inspection of Merchant Vessels, room 37, post-office, New York.

34. Q. After you returned to New York, did you take any steps in the direction suggested by your conversation with Commodore Folger?—A. Yes; at as early date as practicable I finished the drawing of the 4-inch gun.

35. Q. This drawing here?—A. Yes.

36. Q. The two marked in evidence and the third sheet, wh marked 3?—A. The same. And these drawings, or blue prints o drawings, I submitted to Commodore Folger about June 3, 18 received his acknowledgment.

37. Q. A blue print is practically a full-sized photograph, is it A. It is a production of about the same size; it shrinks some that is the only difference; it is printed from the drawing by the of the sun on sensitive paper.

(Counsel for complainants offers sheet 3 also in evidence. It is Complainants' Exhibit Drawing, Sheet 3.)

38. Q. Did you, after that, make further drawings?—A. Aft mitting the 4-inch drawing, I immediately took up the design 6-inch gun, which included a gas check, and which drawing ha requested by Commodore Folger.

39. Q. Such drawings as were indicated by him in that co tion?—A. Yes.

40. Q. When did you complete these?—A. Those drawings we pleted on the 3d of July, 1890.

41. Q. Did you finish those also?—A. Yes; and they were m the Bureau on the 5th.

42. Q. Addressed to Commodore Folger?—A. Addressed to C dore Folger. I received no acknowledgment of these drawin after ten days, about, I wrote to the chief clerk of the Bureau nance and asked him if the drawings had been received, as anxious about them. He replied that they had been received a under consideration. I heard nothing further in regard to then about September 28, 1890, I wrote to Commodore Folger con these drawings and received a reply——

43. Q. Is that the reply which you received [showing a le witness]?—A. That is it.

(Counsel for complainants offers the letter in evidence. It is "Complainants' Letter No. 1.")

44. Q. This letter contains the expression, "The Bureau ha designs developed by its assistants, which it considers superior respects;" that is, superior to yours. Was there anything i conversation with Commodore Folger which enabled you to unde what design that referred to?—A. Nothing. The only mec which he referred to was the Driggs-Schroeder.

45. Q. Then in that conversation he had mentioned no design Bureau itself or designs developed by assistants of the Burea Nothing at all.

46. Q. Were those blue prints of the 4-inch and 6-inch whi sent to Commodore Folger ever returned to you?—A. They we To the best of my knowledge they are on file at the Bu Ordnance.

47. Q. When first did you hear of any mechanism called by th of the defendant, Dashiell?—A. I first heard the name in con with the gun mechanism on reading Commodore Folger's Report Bureau of Ordnance for 1890—I think that is the date—for the year, the year that had passed.

48. Q. When did you first see any of the defendant Dashiell's anism?—A. I first saw it—actually, or drawing?

49. Q. The mechanism itself.—A. The mechanism itself, in the part of February, 1892.

50. Q. Where did you see it?—A. At the ordnance shops at the Washington Navy-Yard.

51. Q. Were you alone or accompanied by someone?—A. Accompanied by Captain Wilson, before referred to, of New York.

52. Q. Did you inquire for the Dashiell mechanism at that place?—A. Yes.

53. Q. Of whom?—A. Officers of the yard who were accompanying us about the shops.

54. Q. Having official connection with the yard?—A. Yes; having official connection with the yard.

55. Q. What did you see there—did you see the finished gun?—A. A number of guns of various stages of completion and mechanisms, the parts of which were stored in a room; these mechanisms were intended apparently for 4-inch and 5-inch guns. I afterwards, on the same day, saw the mechanism attached to the 6-inch gun; it was the mechanism; that is, the major part of it, as it had the De Bange check. The minor parts, such as the firing pin, trigger, etc., were omitted. I worked this mechanism several times, opening and closing.

56. Q. Did you examine it sufficiently to recognize it again?—A. I did.

57. Q. And was Captain Wilson present with you at that time?—A. He was.

58. Q. I show you four drawings, and ask you whether the Dashiell mechanism, which you saw on the occasion you last mentioned, was or was not substantially like that which these drawings portray?—A. Substantially like that? It was.

(Counsel for complainants asks to have these marked for identification. They are marked "Drawings A, B, C, and D for identification.")

59. Q. At the time you saw this Dashiell mechanism at the Washington Navy-Yard had you ever been able to procure drawings of the finished mechanism?—A. I had not been able to procure them.

60. Q. Had you made efforts to do so?—A. I had.

61. Q. Had you applied to Commodore Folger?—A. I applied to Commodore Folger in November, 1891.

(Counsel for the complainants offers a letter in evidence. It is marked "Complainants' Exhibit Letter 2.")

62. Q. This letter, which has now been marked "Complainants' Exhibit Letter 2," was in response to a request from you for blue prints of Dashiell's 4-inch mechanism, was it?—A. It was.

63. Q. Did you apply to Ensign Dashiell for a drawing or a description of his mechanism?—A. As I recollect it, I asked for a description or some idea of it; I could not ask for drawings.

64. Q. That was in December?—A. December, 1890.

65. Q. That was by letter?—A. By letter.

66. Q. You received a reply?—A. The reply was it could not—the drawing could not—be given, because the patent had not been secured.

67. Q. And also that he had orders against letting others see the plans?—A. Yes.

68. Q. Is this the letter?—A. Yes.

(Counsel for complainants offers the letter in evidence. It is marked "Complainants' Exhibit Letter 3." Counsel for complainants offers in evidence a copy of the "Scientific American," published in New York, bearing date of May 24, 1890—simply that part of it which contains a description entitled, "Seabury breech mechanism for rapid-firing

and other guns." It is marked "Complainants' Exhibit 'Scientific American.'"

No cross-examination.

SAMUEL SEABURY.

Subscribed and sworn to before me this 28th day of October, 1892.

SAM'L A. BLATCHFORD,
A Commissioner of the Circuit Court of the United States for the Southern District of New York, in the Second Circuit.

* * * * * * *

In the circuit court of the United States for the district of Maryland.

JAMES B. M. GROSVENOR AND OTHERS, COMPLAINANTS,
against
ROBERT B. DASHIELL, DEFENDANT.

Testimony taken on behalf of complainants before John H. Kitchen, one of the standing examiners of the United States circuit court for the southern district of New York, in accordance with the sixty-seventh rule in equity, as amended; testimony taken before said examiner by consent of the parties.

NEW YORK, *May 12, 1893*—10 o'clock a. m.

Parties met, pursuant to notice, at the office of the solicitor for the complainants, No. 48 Wall street, New York City.

Present, William G. Wilson, esq., solicitor for complainants; Samuel F. Phillips, esq., solicitor for defendant.

SAMUEL SEABURY, recalled on behalf of complainants, being duly sworn, testifies as follows:

Direct examination by Mr. WILSON:

Q. You have already been examined in this cause, Mr. Seabury, and are one of the complainants?—A. Yes.

Q. And in your former examination you stated that you graduated at the United States Naval Academy in 1871. That was the fact?—A. That is correct.

Q. How early in your naval career did you begin, or turn your attention to, inventions?—A. It has always been more or less of a hobby of mine—invention.

Q. I refer more particularly to those things that were especially connected with your profession as a naval officer?—A. I commenced as early as when I was a midshipman, in 1867.

Q. Was that your first essay in invention?—A. That is about the first I recollect.

Q. What was the character, in a general way, of the invention?—A. It was a midshipman's idea of a gun carriage, in which the gun was to furnish its means of returning to battery by the action of gravity.

Q. Did you work it out in the form of a drawing?—A. As well as I could then; yes.

Q. And show it to anyone?—A. I remember showing it to a classmate of mine, to whom I was quixotic enough to offer a half share for the use of his drawing instruments.

Q. Did you show it to anyone else?—A. I showed it to Lieutenant *Commander* Luce—now Rear-Admiral—Commandant Luce.

Q. Was he commandant?—A. Not Superintendent of the Academy, but commandant of cadets. That was in the early days of my history.

Q. Was anything done with it?—A. No, it never came to anything. The present admiral expressed an appreciation of the effort, and didn't know "what I should do when I became rear-admiral," as he said.

Q. What year was that?—A. 1867.

Q. That was your first year at the Academy?—A. First year at the Academy. I went there from the training ship.

Q. After you graduated did you undertake anything further in the way of invention?—A. Yes; several things. That is, in the ordnance line, you mean?

Q. Yes.—A. The first one afterwards that I ever drew out was a gun carriage, a breech mechanism on the side-pull plan—like the Krupp; it was not the Krupp mechanism, but it was something on the same general plan.

Q. A square slot with a wedge block?—A. Yes, a wedge block. In those days the opinion was divided as to the value of slot mechanism and the slotted screw. A good many of the older officers were still in favor of the wedge.

Q. Did you work that out?—A. I worked that out. A model was made of it afterwards by Admiral Simpson's orders at the New York yard, where he was then captain of the yard.

Q. When did you complete that?—A. I completed drawings of that in 1876, and this model was made in 1878.

Q. Was that your own invention?—A. That was my own invention; yes. Admiral Simpson seemed at that time to rather favor the side system—expressed some favorable opinions of some conversions of guns—of old smooth-bore guns which I had made.

Q. What did you do in the way of designing or inventing? I mean in this general direction—matters connected with your profession?—A. That was when I was at sea in 1880 and 1881—1879, 1880, and 1881—on the *Wachusett*, on the Pacific Coast.

Q. What was it you did?—A. Then I worked out the designs of a vessel and her battery, including carriages and the application of this mechanism that I spoke of.

Q. To the guns for the battery?—A. To the guns for the battery.

Q. What was that; a complete plan?—A. I so considered.

Q. Of a full ship?—A. Of a full ship.

Q. Armored and——A. Armored and all.

Q. Where did you prepare those plans?—A. They were prepared on board ship, in the after room—in the wardroom.

Q. What was your position on that ship?—A. Junior watch officer.

Q. With what rank?—A. Rank of master.

Q. What did you do with that design?—A. That design, after I had finished it, I sent to my old commander, Commodore Simpson he was then, and commander of League Island, and requested him to overhaul it and send it to the Navy Department, which he did.

Q. And, so far as you know, it is on file among the archives of the Navy Department?—A. It is on file still; yes.

Q. Did you receive any acknowledgment of that?—A. I received an acknowledgment from Admiral Simpson. I say "admiral" all the time because that was his last rank. He was Commodore Simpson at that time. But the Navy Department apparently paid no attention to it for about four months, and they finally acknowledged receipt, and said it had been submitted for criticism to various bureaus.

Q. You need *not* give the contents. You finally did receive acknowledgment?—A. Yes; acknowledgment.

Q. And notice from the Secretary of the Navy——A. That it had been received.

Q. And you also received a letter in reference to it from the then Secretary of the Navy, did you not?—A. Secretary Hunt; yes.

Q. That letter you have?—A. I have, I believe.

(Complainants' counsel offers said letter of Secretary Hunt in evidence, and it is marked Complainants' Exhibit A[1].

Q. What next did you do in the way of designing?—A. You want me to mention what I did about that work, or anything about that?

Q. No; not at present.—A. The next effort I made on guns was a design of a gun—a breech mechanism on the slotted screw plan.

Q. Prior to that did you make designs for a flagship?—A. Yes. I thought you meant ordnance particularly. That was a design for a flagship which I did under the orders of the Navy Department for Commodore Temple. They were not special orders from the Department; I was simply ordered to report for duty, and given that duty verbally.

Q. Did you work that out?—A. I worked that out and submitted it. I think it was submitted to the first advisory board—I am quite sure it was. Admiral Temple; he was then commodore.

Q. You know that is on file?—A. That is on file, as far as I know.

Q. Did you submit anything to the Getty Board in 1881?—A. I submitted the designs I had gotten up on the cruise before; one of them the breech mechanism I spoke of. That was a board convened in New York to examine guns and mechanism. It was called "The board of heavy ordnance and projectiles." That convened in July, 1881.

Q. What was the general character of the designs you submitted to them?—A. They were what I sent to Admiral Simpson before—to the Navy Department. That was a 9-inch rifle, and the breech mechanism of which I spoke—side-acting mechanism—and a gun carriage, and a projectile having a special system of centering bands, and a fuse.

Q. Were these designs referred to in the report of the Board—official report?—A. They were referred to in the report of the Board and its action upon them.

Q. That report was published?—A. Published; and a copy was furnished me by the War Department, by request. [Book shown witness.] It is referred to on page 51 and at other places of the official report printed in the Government Printing Office in 1882.

Q. Were there any other matters that you worked at before you took up the mechanism of the slotted screw?—A. You mean in regard to ordnance?

Q. Yes.—A. No. After that the report of the Getty Board rather settled my ideas in regard to side mechanism, and I dropped it and did as many an officer did, turned to the screw block, as he should have done long before.

Q. That is in the direct line of breech mechanism?—A. In the direct line of breech mechanism.

Q. But were there not other matters in ordnance that you devised before you got to that point?—A. No; I think they came afterwards. No, let me see; they were about the same time of the other matters—gun carriage and design of a gun.

Q. What time was that, what year?—A. It was in 1883, as near as I can fix it; it was about the summer of 1883, I should say.

Q. That is directly in the line of a mechanism for handling the screw *block you* are speaking, now?—A. For opening and closing?

Q. Yes.—A. Yes.

Q. Had you previously worked at any features of the screw block?—A. Yes. That was included under the same head. I had some peculiar ideas about the screw threads which I wanted to put in; and from that—from that same block, about that time—I got the idea of wishing to simplify the mechanism, the motions.

Q. Was rapid fire known at that time as anything in use for large guns?—A. No. I was about to say this was not in the direction of rapid-fire guns, because they had not come into use for heavy calibers; but simply an idea of mine to simplify the movements for an ordinary breech-loading gun.

Q. Up to that time how were the screw blocks handled in opening and shutting the breech?—A. By the three motions. Generally by a lever to turn the block, then to pull out, and then to swing.

Q. At that time was there any device known which accomplished those motions by one movement?—A. Not to my knowledge.

Q. Either of a lever or of a crank?—A. Not to my knowledge.

Q. When did you first get the idea of a device which would accomplish this purpose?—A. As near as I can recollect, it was about that year—1883. I could not give any time, any special time, in the year.

Q. But do you remember as a fact that it was in that year?—A. I should say so.

Q. I mean when did some solution of the problem first present itself to your mind in the form of a device, however crude?—A. As I say, to the best of my recollection, I carry it back to that year, that I had the idea—an idea which haunted me afterwards a great deal—about being able to open that block by the action of a cam. That was the way in which I put it.

Q. What was that idea? Describe the device as it then presented itself to your mind.—A. Well, naturally, it was not very complete, or I should have worked it out afterwards. The idea was to carry the pin from the block, and by means of a cam on a lever, that is, a cam slot; for instance, when you open that lever to move the block over and then to pull out. But the getting the block out and the subsequent movements were at the time very indefinite to me.

Q. Did you make sketches at that time?—A. Yes; I made sketches then and afterwards; but I have none, to my recollection.

Q. What kind of sketches were they?—A. Just little pencil sketches on the edge of newspapers or anything else—something I never carried out to the extent of making a complete drawing of, because I never got the idea developed enough.

Q. You mean at that time?—A. At that time.

Q. Can you make a rough sketch now which will illustrate the idea that you did sketch out at that time?—A. (Witness makes a sketch and hands same to counsel.) About the action of the lever, of course, I have got to be indefinite, but the idea in my mind was the action of the cam in withdrawing—a sort of a general scheme, general idea. I had to put the pivot off here somewhere [indicating]. "Somewhere" was an indefinite quantity, but, by turning that lever, the action of the slot on that pin was to turn the block first and then withdraw it. As I say, that was as far as I got in it for some time.

Q. In this rough sketch which you have made please add a little lettering, and then give a more full description of the idea.—A. I should call A the block, B the breech of the gun, C the lever, and D a pin extending from the block. Of course, I have not made that sketch to perform any work; I merely want to show what the idea was that I had *by the opening of it?*

Q. Where was the hinge?—A. It would be presumed to be here where that X is, to one side; and, as I recollect, my first idea was to have it over the top of the gun, and I presume this would be X down here [indicating]; still, that I wouldn't say. The general idea was to have the lever pivoted somewhere where the action of a cam could be made to work that pin.

Q. Describe a little more fully how this design was expected to work, in your idea.—A. In my idea—in mine, in mine only, and on the very rough sketches I ever had of it—by the first pull of the lever it was to act to rotate the block to unlock. As will be seen by this sketch, the rotation would have been to the right; but that was a mere——

Q. Incident?—A. Incident of the sketch.

Q. And having rotated, how was the action to be kept up?—A. The block was to be pulled out of the gun by the continued pull of the lever; but there came my trouble afterwards. I could get the block half way, and there I would stick; and there is where it hung fire for some time.

(Said sketch drawn by the witness is marked "Complainants' Exhibit A [3].")

Q. Did you vary that idea by putting the pin in other directions?—A. I tried to work that as long as I could, until finally it developed afterwards into something else—not at that time—and that idea would go and come to me, but I never could get it out of my mind.

Q. What difficulty did you find with it?—A. The difficulties at that time of working the block after rotating it and getting it out. I had not put the tray on, because the tray was, of course, part of the gun, as I considered it. You have got to have something on the gun after you——

Q. The swinging tray?—A. The swinging tray. So I had not got as far as that to make a drawing of it.

Q. What were the difficulties that you encountered in working that idea out? I mean those difficulties which arose from the idea, or were connected with the idea, as distinct from the other difficulties you might have had in finding it?—A. At that time they seemed insurmountable to me at times, and then I would take it up again and work; but I could get the block out partially; sometimes, as I say, it would stick. If you ask me now why I didn't go ahead and perfect it, as I have afterwards, I answer simply I can not tell; but it was perfected afterwards.

Q. You finally reached a time when you could get the block out, did you?—A. Yes.

Q. But at that time were you enough of a mechanic to work the thing out in practical form?—A. Well, I think there are various opinions about my mechanical ability. I have a very modest one myself; some others think I am pretty well up in it, and then again that I am wanting in ordnance knowledge, or have been said to be so.

Q. Did you, at the time when this idea was possessing you, more or less, have facilities for making models and experimenting with the contrivances?—A. No; I did not. In fact, I never had a model made except that breech mechanism which was made in the New York Navy-Yard; I never had a model made in my life until 1887.

Q. Where were you in the years 1885, 1886, and 1887?—A. I was then attached to the flagship of the North Atlantic squadron.

Q. What was the ship?—A. First the *Tennessee*, afterwards the *Richmond*. The *Tennessee* went out of commission.

Q. *At what time?*—A. I think we were transferred in January, 1887, *from her to the Richmond;* I think that was the month.

Q. What position did you have on that ship?—A. Watch officer—watch and division officer.

Q. What rank?—A. Lieutenant.

Q. How engrossing were your official duties at that time?—A. They were the duties of a watch and division officer aboard any large ship, and, besides, the quality of the vessel is a flagship, and, also, besides the properties of the commander of the ship, the admiral, on different occasions, would keep us "whooped up," as the sailors say—very often a drill ashore and a drill aboard. The North Atlantic squadron was not a pleasant seat at that time.

Q. What effect did that have upon your time?—A. Naturally rather diverting to any man's effort to work.

Q. In point of fact, did you have much opportunity during that cruise to work on this idea?—A. No; I had not. I had less than I ever had on board a ship before. The flagship is quite different from another vessel of the squadron.

Q. When did that cruise begin and end?—A. My cruise began in November, 1885; I was detached on the 1st of October, 1888.

Q. During that time did you work at all at this idea?—A. Oh, yes; at various times. I wouldn't swear whether it was the 1st or 2d, but it was the first part of October.

Q. Did you make any progress in developing the idea?—A. Not very great; no, for a long time; in fact, scarcely any, except that the idea would go and come to me; I worked at it.

Q. After that cruise ended, how was it then?—A. After that cruise ended and while I was on shore duty in New York the way to work that principle came to me very easily by somewhat of a change of the cam, as is shown in that gun; the same general principle without—a reversing action, as it were; instead of having the pin on the block, to put the cam on the gun instead of on the lever.

Q. As shown by this model?—A. As shown by this model.

Q. After you completed that cruise you had shore duty, had you?—A. I had shore duty in New York.

Q. Where were you stationed?—A. Stationed at the Board of Inspection of Merchant Vessels, with an office at the post-office.

Q. New York City?—A. New York City.

Q. And then you took residence——A. At Bayonne, N. J. My family had been at Bergen Point all the time; I joined my family.

Q. Did you then devote more time to studying this problem?—A. Yes. I had more time off duty. At first I never had any time in the office there to do anything.

Q. What was the first result of that in the shape of a matured design?—A. This particular one, you mean?

Q. Of your study in that direction.—A. Oh, that I went into before I left the flagship *Richmond*. I got on another track before I left the *Richmond*.

Q. What was that other track?—A. The other track was the opening breech mechanism of a gun in one motion, which I did in another method—another way. I never wanted to use the stepped block of Armstrong, but I did make the mechanism on the Armstrong gun work in one motion; that was at first. That I did in the summer of 1888.

Q. From that did you go on to the cylindrical block?—A. From that I tried the cylindrical block, and succeeded in working that in the manner represented. Do you want me to refer to the model?

Q. Yes.—A. In a manner represented by this model [witness referring to a model present].

(Said model is marked "Complainants' Exhibit L.")

Q. When did you get this design worked out completely?—A. That one was worked out completely in July, 1889. You mean that exact one?

Q. No; I mean that idea.—A. No; it was worked out before that. It was worked out in—the idea was worked out by May, 1889.

Q. And was that followed by your application for a patent?—A. That was followed by the application for a patent.

Q. The patent mentioned in the bill of complaint?—A. In the bill of complaint.

Q. Having worked out this idea, which is represented by Exhibit L, did you stop there, or what did you do in the direction of the same general subject?—A. No, I carried it further; and then, wishing to get rid of different parts, I devised this scheme for doing away with the rack, so as to leave the breech face clear, so that there should be no mechanism in the breech face, except a catch which I used then, and the trigger.

Q. This is represented by this exhibit? [Exhibit shown witness.]—A. Yes.

(Said model is marked "Complainants' Exhibit M.")

(Witness continuing): This was to do away with the rack, to get the rotary movement, and leaving nothing on the breech face when it was open [witness referring to Exhibit M].

Q. Go on and give the history of your progress on this general subject.—A. Afterwards I took up this [witness indicating]. They are so close together that I could not—I should say that this model [witness referring to the one to be marked "Exhibit O"] was fully designed before this one—Exhibit M—of which only working drawings for a model were made at first.

(Said model just referred to by the witness is marked "Complainants' Exhibit O.")

Q. You mean that the working drawings of Exhibit M were made for a model, in your last answer, do you?—A. Yes; of Exhibit M.

Q. You say M and O came so near together in point of time——A. In point of time that I confused them for a moment.

Q. That it is difficult to say precisely the order?—A. I know that O was designed before M.

Q. What date do you give O?—A. For O I should give the commencement of October, 1891.

Q. There is here another model, which we will mark Exhibit N. When did you complete this device?—A. N was the outcome of M, and was designed to still further reduce the complication of pieces in February, 1892, M being designed during the winter of 1891-92; I could not specify the month, probably January.

(Said model marked "Complainants' Exhibit N.")

Q. Have you stated fully the history of your efforts now from the time when the first idea took shape in 1883 down to the present time?—A. Well, to the present I have carried it still further; I have put the mechanism attached to the model O; I have put it on a 5-inch gun recently, in a slightly different form, using a carrier ring with a tray to the rear; that is, the tray is made from what are now the guides for the lever on the carrier ring in model O, being placed at the bottom, so that the block must rest on the tray, and the lever standing vertically from the hinge here at the center of the carrier ring, vertically, and the hinge being on the side.

Q. *That, then,* is not one continuous movement of the lever?—A.

he one I refer to is for a small space, and not necessarily one continuous movement; it is a straight pull for the unlocking, withdrawing, nd a swing for the throwing aside of the block; it is not a continuous traight movement.

Q. Have you given the history of your efforts at solving the first roblem which presented itself of opening the slotted screw cylindrical lock with the continuous movement of a single lever?—A. I should ay that covered the history.

Q. From 1883 down to the present time?—A. Down to the present ime. I could state what work I was engaged upon which interrupted great deal of that time, if you wish.

Q. Did you follow the thing up as diligently as your official duties permitted you to do?—A. I should say I did.

Q. And the first outcome was the mechanism shown by Exhibit L?—A. There the first one movement was the Armstrong—the double-slotted block, which, as I said, I didn't care for.

Q. That was the stepped block?—A. That was the stepped block, but not cylindrical block. The first one of the cylindrical block was shown in Exhibit L.

Q. The Armstrong conical?—A. It is conical and double stepped, too. There are two series.

Q. That conical form of block eliminated one of the three motions?—A. One of the three motions; left but two.

Q. But for the mechanism which should accomplish the three motions with the same continuous movement of the single lever, the first that you worked out into a practicable form was L?—A. Was L.

Q. Having turned from the original idea to this?—A. To what seemed to me a more easily arrived at result, although certainly much more complicated.

Q. And that was followed next by O?—A. By O, which was the outcome of my original thought.

Q. And then followed M?—A. M.

Q. And then N?—A. And then N.

Q. And all these models have been made from your own designs?—A. From my own designs and under my own superintendence.

Q. Now, at the time of your application for a patent upon the mechanism which L represents, did you have knowledge that there was any other device that had ever been made or patented for accomplishing those three motions with a continuous movement of a single lever on a cylindrical slotted block?—A. I did not.

Q. Did you at that time know of the invention of Canet in that direction?—A. I did not.

Q. Or of Nordenfelt's?—A. I did not.

Q. When did you first learn anything about Canet?—A. I first heard of Canet's invention when it appeared in a paper which I occasionally saw at that time, the London Engineering. I won't be positive whether it was Engineering or Engineer.

Q. I think it is Engineering.—A. I saw it in both papers, but at different times; but the first paper, I think, was the Engineer.

Q. When was that?—A. That was the summer of 1889.

Q. Was that before or after your patent was applied for?—A. The summer of 1889, did I say? No; it was a year later—the summer of 1890.

Q. It was after your first patent was issued?—A. It was after the first patent was issued; yes.

Q. That is, after the issue of the patent in suit?—A. Yes.

Q. And when did you first acquire knowledge of the existence of Nordenfelt's English patent 7195?—A. I first saw that patent, or first heard of it, in fact, when it was shown me by yourself in this office.

Q. During the pendency of this suit?—A. During the pendency of this suit.

Q. Were you ever offered a position in the Bureau of Ordnance of the Navy?—A. Never.

Q. Either directly or indirectly?—A. Either directly or indirectly. I have heard it said that I ought to be there; but that is all that I have ever heard in relation to it.

Q. Did Commodore Folger ever request you to unite yourself with that Bureau?—A. Never.

Q. What did he say to you on the subject?—A. When I showed him the model L, he remarked: "Seabury, you ought to have been in this Bureau." That is the only conversation I ever had with him in regard to it.

Q. Did Commodore Sicard ever request you to unite yourself with the Bureau?—A. Never.

Q. And you never had any orders to that effect?—A. Never had any orders to that effect.

Q. Is Exhibit L the model which you referred to in your former testimony as the model you showed Commodore Folger in Washington at the time you had the conversation with him?—A. It is.

Q. In regard to giving the mechanism a test?—A. It is.

Q. The identical model?—A. That model was shown at that time, but the drawings for the mechanism I suggested were somewhat modified from that—I wish to say that—simpler.

Q. Reference has been made in some of the proofs to a 5-inch gun which had mechanism of the general character shown by the Model L, and was in the hands of the army officers at Sandy Hook. You were familiar with that gun, were you?—A. I was.

Q. Did you make the drawings?—A. I made the drawings for the mechanism.

Q. For the mechanism?—A. For the mechanism.

Q. State whether or not there was any difficulty in the working of the breech mechanism in that gun?—A. No difficulty whatever, with the exception of the extractor, and a fault which I myself saw—the great swing of the lever. That would not constitute a difficulty in the working; it was merely a difficulty in the handling.

Q. What made the difficulty with the extractor?—A. The extractor was placed in too small a space—the extractor, or the lever which threw out—the main extractor in the gun—and my first design for the trip hook, which was caught by the tray in opening, was too light, and broke in extracting the empty case.

Q. What was the extractor intended to remove in that particular gun?—A. It was intended to remove a short metallic case or gas check, like a vessel ammunition case, except shorter, with which I had endeavored to show the principles of a rapid-fire gun on a gun which it was impossible to convert to that idea.

Q. What was the structure of this cartridge base?—A. The cartridge base was of drawn brass, and on its base was a steel cup carrying the flange by which the empty case was to be withdrawn from the gun by the extractor. This steel base was riveted to the brass cup. Unfortunately, in manufacture, the proper quality of steel was not used; it *had no temper;* and under every shock of discharge, every expansive *action, the cases* would be set out more and more into the bore of the

gun until they stuck so that no extractor under a rammer from the muzzle would get them out.

Q. In other words, the effect of the discharge was to hammer them and spread——A. Hammer them and spread them; and they never returned to anything like their original position.

Q. And they wedged?—A. And they subsequently wedged in entering the case after another cartridge. They were not intended to enter separately at first; the cartridge back was supposed to screw to the wood disk, and this was held within the brass cup, thereby making one cartridge of it with its own gas check.

Q. Have you read the testimony of the defendant in regard to the action of the gun as he saw it at Sandy Hook?—A. I have.

Q. What have you to say as to the gun ever acting in that way in your experience?—A. I have never seen the action which the defendant speaks of—the connecting pin here between the retractor and the lever pivot and crank—I have never seen that disconnected in forcing cartridges into place. I have been surprised myself because I expected to see it go. I have seen it working hard, but I have never seen it disconnected. That was the trouble that was witnessed at Sandy Hook. Those cases wouldn't be shoved into place except by a hard ram.

Q. Then you attribute that difficulty, as far as it occurred, to the expansion of these cases and the consequent difficulty of ramming them into the gun?—A. Of ramming them into the gun, I should call it.

Q. How many times did you handle that mechanism on the 5-inch gun?—A. I couldn't say; a great many times, naturally, being the inventor.

Q. A dozen or a hundred?—A. A hundred times, at least, is a very safe estimate.

Q. When did the idea of taking out a patent on any of your inventions first occur to you?—A. I never took out a patent—I don't say that the idea never occurred to me—but I never took out a patent until 1887, on a device for handling ammunition.

Q. Did anyone suggest to you to do that?—A. Yes; it was suggested to me by one person—I remember very distinctly—Commodore Folger.

Q. What did he say?—A. I was at the Bureau of Ordnance inspecting the shell lift with Commodore Sicard, who was then chief of bureau, and Commodore Folger was then inspector of ordnance, and he was in the office at the same time; and after Commodore Sicard had expressed his opinion of it, which, as I recollect, was favorable, Commodore Folger followed me into the next office, and he said, "Seabury, that is a very good thing. Patent it all over." Or he may have said, "Patent it everywhere." I wouldn't say which.

Q. Had you patented any of the numerous previous devices which you have spoken of in your testimony?—A. I had not.

Q. What has become of the sketches and drawings, such as you made in the progress of your working at this original idea of breech mechanism?—A. I never made anything more than the small hand sketches on my lap, when I was taking a quiet smoke, sometimes on board ship; I mean I never went to the extent of a drawing other than those small sketches. But I presume they were destroyed, as you would take a piece of paper and when you would get disgusted with the idea for a moment, would drop it, and would take it up again, or would lose the paper, and never keep any memorandum of it.

Q. Have you looked among your papers to see if you have any of those left?—A. Very thoroughly. I can not find them. Anything in the way of finished drawings I have generally managed to keep, not

withstanding my movements. It is not an easy matter to keep your papers, moving around.

Q. I suppose at the time that you made those drawings you had no anticipation there would be ever such a question as is here presented?—A. Never the slightest.

Q. Of what State are you a native?—A. New York. Long Island, if you call Long Island part of New York State.

Q. (Certain blue-print drawings shown witness.) When was it that you got up the designs which you have spoken of for a flagship?—A. That was in 1881.

Q. Did you also get up designs for a gunboat?—A. I subsequently designed a gunboat for Admiral Porter, commencing in the early part of 1884 or the latter part of 1883, and being occupied upon it very continuously until the summer of 1885. That was by order, the Department ordering me to Admiral Porter's staff, and being under the Admiral's directions to do this work.

Q. It was official duty, then?—A. It was official duty.

Q. Did you complete the designs?—A. I completed the designs twice; the first time on one scale, and then enlarging them to another scale. This represents the second scale [witness indicating said blue prints].

Q. This drawing?—A. That is, this set of drawings; not this one.

Q. What labor did that involve; of what character?—A. It involved the laying down of the ship, the general planning of all her scantling, of all her arrangements—of the battery, of the decks, of quarters, of storerooms, magazines, shell rooms; everything, in fact, in relation to a ship; the calculation of the weights and the center of gravity in detail, of the hull, the equipment, and all the fittings of a ship; her lines (that came first, however), her displacement, her metacentric position, all her curves of buoyancy, etc.; the power of her engines necessary for a certain speed; about everything under the head of shipbuilding.

Q. Her armament?—A. Her armament. Of course, I used the existing guns at that time (service guns); put them on the ship.

Q. Place for battery?—A. Certainly; everything in relation to a man-of-war.

Q. What was the idea of the boat?—A. She was built to carry out the Admiral's idea or design—to be built to carry out the Admiral's idea of an improved *Alarm*, that being his pet torpedo vessel. He wished to adhere to a good many points that I can not say that I, as a younger man, thought much of; but still I carried out the designs to the best of my ability, as I was on duty for his work and not mine.

Q. And that pretty continuously engrossed your time?—A. That was very continuously, night and day.

Q. Involved a great deal of computation?—A. A great deal of computation and a great deal of labor, as a glance at some of the plans, some of the general results, I think, will show.

Q. Have you the drawings here?—A. Those are the blue prints of some of the plans of the ship [witness indicating said blue prints]; but the calculations are not here, unfortunately.

(Said blue prints are marked "Complainants' Exhibits B^1, B^2, B^3, B^4, B^5, B^6, B^7, B^8, and B^9," for identification.)

Q. To recur for a moment to the original idea of which you have made a rough sketch in Exhibit A^2, were there any other forms or particulars of that that you recall during your early study of the matter? *And if so, please show them by a similar sketch.*—A. It was very similar. *I carried the pin* below the gun. [Witness makes a sketch.] That

was merely a variation in the idea—having the pin extend below the gun, to get more of a sweep; but it was discarded as being too weak mechanically.

Q. On account of the length of the pin?—A. Yes.

Q. And weight of the block?—A. And weight of the block; and as I considered at the time, and also in connection with anything that had to support the block when it was out, I didn't at the time see the way to support it.

Q. Now, while working at this idea on shipboard, you of course had nothing to work with but pencil and paper?—A. That is all. I had, of course——

Q. Or drawing tools?—A. I had drawing tools when I wanted them.

Q. You had no mechanical contrivances for experimenting with the different forms of the structure or shapes of parts?—A. No; not at all.

Q. Or lines of cams. It was purely a mental exercise, was it?—A. In fact, it wouldn't have done for me, if I had desired to keep it for myself, to get anybody else to do it aboard ship. Getting one of the men to do it would make it public property right off.

Q. How old were you when you went into the Navy?—A. I entered the training ship *Sabine* when I was 15 years and 10 months old.

Q. And your whole life has been spent in the Navy?—A. All except the years previous to that.

Q. And all the designing that you have done in the various directions mentioned has been, with the exception of the designs of the flagship and gunboat, voluntary work on your part, in addition to all your official duties?—A. Oh, yes; it was, all of it.

* * * * * * *

In the circuit court of the United States for the district of Maryland.

JAMES B. M. GROSVENOR AND OTHERS, complainants, *against* ROBERT B. DASHIELL, DEFENDANT. } Before John H. Kitchen, esq., examiner.

NEW YORK, *June 10, 1893.*

Present, counsel as before.

SAMUEL SEABURY recalled as a witness on behalf of complainants.

Direct examination by Mr. JENNER:

Q. Lieutenant, I want to ask you a few questions with respect to your early ideas about breech-loading guns. What led you to the making of the invention which is described in your patent here in suit?—A. The idea was to simplify the movements necessary to open the breech.

Q. When did that idea occur to you?—A. I had first that idea prior to the cruise of 1885. As I stated before, the very first idea, as I recollect, was about 1883.

Q. What was your object in wanting to simplify the mechanism for opening the breech?—A. To gain time.

Q. To gain time in what?—A. In loading the gun, and charging also.

Q. Did you have any idea of how you wanted to simplify that movement?—A. Yes; the ideas were quite clear.

Q. What was the idea?—A. The construction of the gun made it so. In order to fire the gun it must be locked, and in the screw mechanism the block is in the gun and screwed up. This block and the gun have slots which allow the block to be withdrawn after a partial revolution. My idea was at first to rotate the block to the necessary amount, then

to withdraw it from the gun upon the tray, which was an old idea already in use, and afterwards to swing the whole mechanism from the breech of the gun.

Q. Your mechanism, which you contemplated improving, did that have a breechblock which was rotatable in the breech on a screw?—A. Yes, sir; I have just described that.

Q. Did that have a tray on it from which the block was withdrawn?—A. Yes, sir; all guns have either a tray or a carrier ring.

Q. Then you contemplated using in these improvements of yours two elements of the old gun?—A. They were necessary parts in the mechanism in a gun of that kind.

Q. What were the first ideas that occurred to you of the means of doing this?—A. The very first idea I had, as I recollect it, for rotating the block was the natural means of a rack.

Q. By "rack" you mean the rack and pinion?—A. By a rack tangential to the surface of the block to work the thing over.

Q. Did you have any idea of the means of working the rack, and if so, what was the idea?—A. The means that I had, or thought of at first, were to turn that rack, to move it by some connection with a shaft which, when worked by a lever or handle, would slide the rack from side to side and so work the block.

Q. What means occurred to you of withdrawing the block from the breech?—A. I had a general idea of withdrawing the block by an arm onto the tray.

Q. How did you contemplate working that arm?—A. The idea was to move it in connection with the other parts of the mechanism—to take one movement after the other.

Q. The only parts of the mechanism that thus far you have mentioned, or mentioned before, is the arm which was to withdraw the breech block. Is that the part which was to operate the rack?—A. Yes.

Q. You intended, then, to have the arm for withdrawing the breech operate after the mechanism which operated the rack?—A. It had its natural sequence, and that same idea I carried out in the form of a lever and an open-arm block which I have already described.

Q. Did you contemplate attaching the arm for withdrawing the breech block to anything?—A. To the breech or the gun, as it seemed to me the most natural place to put it.

Q. To the breech of the gun directly?—A. What do you mean—through a bearing? There must be a bearing, of course.

Q. What did you contemplate using as the bearing?—A. I don't understand exactly your question. Of course there must be a shaft to work the mechanism.

Q. That is what I was endeavoring to get at.—A. There must be a shaft or pivot.

Q. Do you have in mind now that in your explanation of this matter a shaft and a pivot is the same thing in this connection?—A. Yes, sir; I have referred to it in my other work as the same thing.

Q. Now, what was the next thing in bringing about this simplicity that you contemplated doing?—A. How far did you get, to the withdrawing of the block?

Q. To the withdrawing of the block.—A. After the block was on the tray, to swing it to one side.

Q. What means did you contemplate of doing that?—A. The general idea that I had was that the movement would be followed up. The *movement of the* lever which did all these things would have to carry *the tray in connection* with the block to one side.

Q. By what means did you contemplate carrying the tray away with the block on it?—A. By a lever by the shaft.

Q. Did you contemplate attaching the lever to anything besides the tray?—A. The lever would have to be attached through various movements to everything. Its motion would have to be taken up one after another.

Q. What do you mean by "taken up one after another"?—A. The different movements; it would have to rotate, withdraw, and carry to one side—the lever must do all that.

Q. Did you mean that one lever would do the whole, or different levers do different parts?—A. If I had the idea of an arm to pull the block out, I would have to operate that arm by the lever at the same time and same way with the tray.

Q. Did you expect that the lever which should carry the tray away would be connected so as to get your continuous movement that you have told about?—A. To the shaft or above.

Q. Where did you expect to fulcrum your shaft?—A. On the breech of the gun.

Q. Then, as I understand it, your object was to simplify the operation of loading, and to do that you intended to rotate the breechblock, withdraw it, and carry it away by a consecutive movement of a lever?—A. That was my idea from the first.

Q. And the various arms which should govern the rack for rotating the breechblock, for withdrawing it and for carrying it away, were to be attached to a shaft, should be fulcrumed upon the breech of the gun, and should be operated by one lever?—A. That is the idea.

Q. Now, when did you have that conception of the means of accomplishing what you wanted to do?—A. Prior to the cruise that I went on from 1885 to 1888.

Q. Prior to that cruise?—A. Yes, sir.

Q. Now, when did you work on the details of those means in proportioning one part to the other?—A. Whenever I got an opportunity.

Q. During what period?—A. Probably from the period of my conception I was working at various times on it. The time was very irregular; I had a great many things to do.

Q. Did you work on it while you were on the cruise?—A. Yes, sir.

Q. But in the rough way that you have already mentioned?—A. But in the rough way that I have already mentioned in my former testimony.

Q. Did you have any facilities while you were on shipboard for making any working model?—A. No, sir.

Q. As a mechanic do you think it was impossible, or with your knowledge of mechanics and the practical application of mechanical forces, do you think it would be possible or practicable to correctly proportion those various parts without either carefully drawing or the making of a model?—A. No, sir; I do not.

Q. I understand you to say there was no opportunity for either while you were on board?—A. There was hardly any opportunity for anything on board of ship.

Q. Did you work out the mechanical details of your arrangement of levers, which you had before thought of, and the proportion of one part to another, at the first opportunity that you had?—A. Yes, sir.

Q. When did that first opportunity occur?—A. The first real opportunity that I had for work was after that cruise expired—the latter part of it—when we were laid up.

Q. Were *you not on* shore from the 1885 to 1888 cruise?—A. In the

latter part of the cruise, in 1888, I had some opportunity which I improved.

Q. Where were you then?—A. At the navy-yard, the last three months, and had more opportunity.

Q. What did you do then?—A. Then we tied up alongside the dock and the ship was preparing for a foreign cruise, and I expected to leave her, which I did shortly afterwards.

Q. What did you do there toward working out your idea?—A. Then I undertook to work it right down to form, to get a breech mechanism that would work. Then I got out two or three ideas after that, which resulted in this one thing.

Q. I would like you to give a clearer idea of your duties on shipboard for the purpose of showing to the court just how your time was occupied in the daily routine of the ship's work.—A. Well, some ships vary from others, but the flagship work—this was on a flagship—is always more than other work. The flagship that I was on was blessed on two occasions with admirals with very great exercising propensities, who kept us on the move quite continually.

Q. Well, is one day a specimen of the rest on shipboard?—A. Not altogether. In the first place, I was a watch officer. I was an intelligence officer. I had to write up intelligence of the various things, that is, fortifications and things of that kind.

Q. Were you an active officer?—A. Yes, sir; standing watch in my turn, night and day.

Q. We civilians don't understand precisely what that means. Won't you give us an idea of the daily routine of your work on shipboard while you were watch officer?—A. Taking my own case, for instance, there was a greater part of the time we were in what is called four watches; in other words, four officers to do the ship's work, taking charge of the deck. Taking charge of the deck involves temporary command of the ship, taking practical command of the ship, especially during night watches, as the watch officer is the representative of the captain. In men-of-war, especially in the ship that I was on, the duty was kept up by the regular watch officers as strictly in port as at sea.

Q. I want to know what you did; how your twenty four hours were spent?—A. Well, for instance, a man would have at sea the middle watch, 12 to 4 a. m. Of course, he had to get his sleep after.

Q. You would sleep from 4 o'clock to when?—A. From 4 o'clock to 8.30, say; that is, for that man. Then at 9.30 there would be quarters for inspection.

Q. What do you mean by that?—A. An assembly for inspection, the same as on shore—quarters for inspection or assembly for inspection on shore.

Q. Explain what you mean?—A. The gathering of the crew at certain places at the guns for inspection.

Q. What did you do as watch officer—what did you have to do with that?—A. I was about to say at these functions the watch officers were the men most in demand, as they were in immediate charge of divisions of men corresponding to companies of men in land forces.

Q. In other words, the crew is divided into divisions, and a certain division is put under charge of each one of the watch officers?—A. Yes, sir.

Q. How long did that inspection take?—A. That inspection and the following exercises would take something over an hour.

Q. That would be supervised by you as watch officer when it was *your watch*?—A. This comes outside of the watch.

Q. At the end of the hour what did you do?—A. At the end of the hour—there were various duties—at the end of the hour I might have been on a summary court-martial. The court must meet. That court might be in session for two or three days, even, occupying the time when you are off duty, or you might get your rest. These are the things which are irregular. I might be on a board of survey to survey the ship's stores. I might be on a board to examine some particular part of the ship's equipment which was faulty, or such things as that the watch officer is called to do; his time is not his own.

Q. He was busy about something?—A. Busy about something all the time.

Q. That would bring you up to when?—A. To noon.

Q. What took place then?—A. Then came the midday meals.

Q. How much time for that?—A. An hour.

Q. Then, at the end of the midday meal?—A. At the end of the midday meal afternoon exercises.

Q. What were those?—A. Ship's routine, exercises of different kinds, drills.

Q. How long did that take?—A. Generally an hour.

Q. Well, then what?—A. Then it is quite possible the court sat again in the afternoon, if it was sitting in the forenoon, or the board. I don't say that is daily; there is always a possibility of it.

Q. That would bring you up to what hour?—A. To say about 4 o'clock.

Q. What would occur then?—A. On watch again.

Q. How long on watch?—A. At sea the watch would be short; that would be only two and a half hours to carry you over to the dinner relief.

Q. Then what?—A. Then came your evening quarters again; no exercises then.

Q. No drill then?—A. No.

Q. What did take place?—A. Sundown and dark.

Q. Were you busy?—A. After that, no.

Q. During what time were you not busy?—A. Well, the dinner hour would take you up to about 7 o'clock, and then after that we would be off, unless you went on watch again.

Q. How long would you be off?—A. Then you would go on next morning at 4 again—4 to half past 8.

Q. When did you go to bed?—A. If a man wanted to get any sleep he went to bed about half past 8. The routine is regular, but the things you have to do are very irregular.

Q. As you have described the day, is that a fair specimen of the daily routine of an officer of your rank on board of a man-of-war when the admiral is there?—A. Yes, sir; except there is more of it sometimes.

Q. There is not less?—A. There is not less. I don't mean that those courts and boards would meet every day; that is a possible thing, but you always have to stand the chances of that.

Q. Practically, when you are not eating and sleeping——A. You are liable to be called upon to do something.

Q. There is some official duty to be performed connected with your officer's work?—A. Nearly always, or you can stand in momentary expectation of having it. It is a case of constant stand-by on board ship. You don't know what you are going to do next.

Q. When you receive orders to do something, you have got to do it right away?—A. Yes, sir; beside the ship work, we have several land parties, where we have ten days and camp out and become soldiers—

a camp regularly established—a camp for instruction. There, of co anything like work is out of the question.

Q. In those hours which you have given, you have stated abou amount of time that is taken, but the portion of the day when watches would come would vary?—A. Yes, sir; they are change what they call the dog watches. The four-hour watch is divid two-hour watches, which alternates the watch of each man every

Q. You spoke of having a division under your charge?—A. Ye

Q. What were your duties in respect to that division independ of watches?—A. Entirely in charge of the division; and, where i a gun division, you had charge of the guns, to see they were always erly in order—properly equipped. My division, for instance, cons of four 9-inch guns at that time, and all the clothing and wha called small stores for the men of the division are required for regu on requisitions which the officer of the division has to take char and generally has to make out. I always did, because I seldom h sub in my division.

Q. Then, how about instruction?—A. Then instruction; the also instruction of apprentices. There was on that ship a b appointed to examine apprentices. That, of course, was quart which you always had to take your turn at.

Q. As to drill, did you have to instruct your division in drill? Yes, sir.

Q. In what line of exercise did you have to drill them?—A. In guns or ordnance, in infantry and artillery and sword practice, drills, torpedo exercises and boat drill, and many things which covered by oral instructions, without reference to any particular br or arm, you might say.

Q. And for the purpose of giving that instruction did you ha keep yourself well posted all the while?—A. Naturally, because questions would be asked which would be very unpleasant for an o to be unable to answer.

Q. That involved study?—A. Yes, sir.

Q. Did you have duties to do in the way of writing at sea, wr up reports of watches, or any such duty?—A. You mean the log?

Q. Yes.—A. That is so small a time there is no need to count I would not like to be put down as referring to that as a piece of

Q. When you acted as intelligence officer, what is that?—A. Th an office which now on board ship is given to one of the watch of as a rule, and he is supposed to make himself thoroughly acqua with all the improvements that he meets abroad either in foreign or armaments, forts, or anything that is of interest to the Department.

Q. Did you act as intelligence officer?—A. At a part of the time intelligence officer for over a year.

Q. On the admiral's ship is there also more or less time taken u formal entertainments?—A. Yes, sir; and social functions; there great deal of social work going on which an officer has to take share of.

Q. It is a duty, more or less?—A. It is more or less of his duty

Q. It is necessary to your departmental standing on a ship to the company of the officers?—A. Yes, sir; he has to take his sha such things as that.

Q. When did you work on the plans and drawings of this gunb what amount of your time daily was consumed in that?—A. Practi *all my time except* what I required for natural necessaries of life.

Q. Eating and sleeping?—A. Yes, sir. That was a work which required a great deal of constant labor, and labor in thought as well as labor manually.

Q. And often when not actually engaged with your pencil in your hand——A. I was studying up some improvement.

Q. That absorbed your mind?—A. That was constantly; I can say all my time was taken up with that work while I was working.

Q. How many hours would it be in the twenty-four?—A. I know many days I have been on my feet over ten hours.

Q. Drawing?—A. Yes, sir.

Q. That was official duty?—A. Yes, sir; because I was attached to Admiral Porter's staff to work that gunboat up.

Q. After you landed from your cruise, when did you begin to make actual working drawings for your invention; either before or after you landed?—A. I began before I landed; I began to work them up.

Q. How long before you landed—I am referring now to the working drawings?—A. I made a general plan before that; I didn't make any working drawings.

Q. You didn't make any working drawings before you landed?—A. I made drawings which led up to the minor details to get it down to actual working.

Q. That you made during the time the ship was in cruise?—A. The very last months of the cruise—after I went ashore.

Q. When did you begin to make working drawings?—A. I didn't do this until 1889.

Q. Do you remember the part of the year?—A. The early part of the year—the spring.

Q. When did you begin to make drawings, with reference to a patent—to get a patent?—A. I used those drawings for the patent; I used working drawings. When I say working drawings I don't mean shop drawings, but drawings which would allow the machinery to be constructed so it would work.

Q. Those drawings which you began before you landed from the cruise were utilized in making the Patent Office drawings?—A. They were utilized—the continuation of them; I went from one thing to another; I was working on the same idea, but they evolved from the one idea to the other until I got to the Patent Office drawing.

Q. When did you have the Patent Office drawing begun?—A. I began this about May, 1889, I think.

Q. When was the patent applied for?—A. Applied for, I think, in June or July.

Q. Were these drawings that were filed with the application for a patent made from a model?—A. No, sir; I didn't have a model.

Q. From what were they made—your own drawing?—A. Yes, sir.

Q. Made by you?—A. Yes, sir.

Q. Some of which were made before you landed from your cruise?—A. I don't mean to say they were actually made.

Q. I mean the drawings from which these Patent Office drawings were made were begun before you landed from your cruise?—A. Yes, sir.

Q. That arduous labor on the gunboat lasted how long?—A. About eighteen months.

Q. It began when?—A. It began in—I think it was—the early part of 1884.

Q. And terminated when?—A. In the summer of 1885; just before I went on that cruise.

Q. What was the interval between finishing that work and going on the cruise?—A. I think about three or four months.

Q. What were you doing during that time?—A. Taking a little rest.

Q. Were you used up?—A. Pretty nearly used up.

Q. The drawings which you began while you were on shipboard, that you worked on while the ship was here over at the navy-yard—on what scale were they?—A. I don't recollect.

Q. Do you know where they are now?—A. I do not.

Q. Where were they when you last saw them?—A. The last time I saw them I sent them to the lithographer; I have lost track of them.

Q. When was that?—A. In 1888—the first ones.

Cross-examination by Mr. PHILLIPS:

Q. I produce a letter purporting to be written by the witness, Seabury, and verified by the witness, addressed to Messrs. Wilson & Wallis, dated March 9, 1892, and filed by your counsel with the Secretary of the Navy at that time, and ask you if you wrote that letter?—A. Yes; I have no doubt but what I wrote the letter. I am assured that it is an accurate copy.

(Counsel for the defendant introduces in evidence two letters, one from Wilson & Wallis to the Secretary of the Navy, dated March 10, 1892, Marked Defendant's Exhibit No. 1, of this date.

Also a letter of Lieut. Samuel Seabury to Wilson & Wallis, dated March 9, 1892, and inclosed in the letter of Wilson & Wallis addressed to the Secretary of the Navy, marked "Defendant's Exhibit No. 2," of this date.)

Q. I understand that you have no drawings at all to indicate the progress of your devices?—A. No, sir; they have been lost through my various movements. I have moved my house——

Q. Have you inquired for them?—A. Yes, sir; I know that a number of rough sketches I have thrown away.

Q. You say you left some with the lithographer?—A. I mean the 1888 drawing I spoke of. That was a drawing for an automatic operation of a breech mechanism. It was in the same line as this was—followed it right up; not the actual thing.

Q. I understand you to say that the idea of unlocking, rotating, and withdrawing the block occurred to you first——A. Prior to the cruise of 1885 to 1888.

Q. Did you make any drawings that conveyed that idea?—A. How do you mean conveyed?

Q. That conveyed it to anybody that saw it?—A. No drawing; such drawing as I spoke of and illustrated the other day; little sketches. I never got to the point of making a drawing which would show it clearly.

Q. You have no drawing at all?—A. No, sir.

Q. Did you ever reveal the idea to anybody?—A. No, sir; I did not do it for this reason, that it was a thing that I wanted to do, but I had not got it far enough along to show anyone until later, when I got it up in same sort of shape; I did not do that until later.

Q. When was that later?—A. Well, I can't say that I exhibited it to anybody until I got it so it would work.

Q. That was —— A. In the early part of 1889.

Q. The first time that you exhibited anything that would show the idea, I mean to say this very idea, to a third person was in May, 1889?—A. About that time; when I got it so that it actually worked.

Q. I believe you said in your last examination that was May, 1889?—*A. I forget whether* I did or not; I think that was about the time.

Q. The idea was worked out in May, 1889, is what you have said *here in the testimony*?—A. Worked out finally.

Q. You had no drawing of it before that?—A. No, sir; I mean to say that all I had before that was my own idea to get it to work, but not reduced to a drawing, not reduced to a practical drawing. I had little sketches and things of that kind that I kept to myself—many a thing I have done that way.

Q. Did you have a drawing of your own that exhibited the whole idea?—A. Not prior to that; no, sir.

Q. Not prior to May, 1889?—A. No, sir. Those little sketches which I showed you in the other evidence were such as I had.

Q. The idea of having a lever formed by means of cams, several changes of motion, is not a new one, is it?—A. You mean new in regard to guns.

Q. New in general, in mechanics. I am not talking about guns. That a lever by means of cams should make changes of motion is not new in mechanics?—A. I should say not.

Q. How old is it?—A. I would not dare say.

Q. Older than your school days?—A. I believe it must be older than I am.

Q. Your view was to apply that old principle to a gun?—A. Yes, sir; to bring the action of a lever, to make the lever do all the work, the three motions.

Q. An old idea of lever working, making several motions, changing its motions in several different directions by means of a cam, was an old principle in mechanics, an old idea, was it?—A. The adaptation of the old plan to a new thing.

Q. Adapted to that?—A. Yes, sir; adapted to that.

Q. That you worked out in the course of these years you speak of?—A. Yes, sir.

Q. And your first drawing of your idea was in May, 1889?—A. Yes, sir; that was the first drawing which shows the actual workings of the machine. Prior to that I had it in small sketches.

Redirect by Mr. JENNER:

Q. This letter of March 9, 1892, purporting to be addressed to you by Messrs. Wilson & Wallis, and which was forwarded to the Secretary of the Navy, was that letter your own composition?—A. Yes, sir; I recollect it was. I know that I submitted some such letter as that.

Q. Did you compose it or draft it?—A. Yes, sir.

Q. Did you compose it or somebody else for you?—A. No; I compose my own letters as a rule.

Q. At that time—at the time of composing this letter—did you know what the legal construction of the term invention was or in what the inventive act consisted?—A. No, sir; not as I have had it explained to me since. I imagined at that time that it must be a completed invention.

Q. That the invention was not made until it was completed?—A. That it was a completed thing; that it could not be a mere idea of principles or grouping of principles; it must be a complete thing.

Q. A practical working thing?—A. Yes, sir.

Q. A reduction to practice of the idea?—A. Yes, sir.

Q. And that the invention was not made until that was done?—A. That was the idea I had.

By Mr. PHILLIPS:

Q. Mrs. Levinia Wilson is the wife of the complainant, Capt. J. W. Wilson, who testified on a former hearing in this case?—A. Yes.

By Mr. JENNER:

Q. Where were you when you drafted this letter of March 9, 1892?—A. I wrote one letter at home; I don't know whether that is the one or not.

Q. Look that letter over and see if that is the one that you wrote at home?—A. Yes; I wrote that letter at home.

SAMUEL SEABURY.

After signing and swearing to his testimony, the witness desired to make the statement that he did not wish to be understood, in answer to the last question on page 27 of his deposition, that he had never taken out a patent. He meant to be understood as saying that he never took out a patent for ordnance. He had previously taken out one patent for a car ventilator, about 1877 or 1878. This statement is put upon the record by the examiner in the absence of counsel, at the request of the witness.

June 15, 1893.

JOHN H. KITCHEN, *Examiner.*

* * * * * * *

WASHINGTON, D. C., *December 22, 1892*—10 o'clock a. m.

Met pursuant to adjournment, at the office of Phillips & McKenney, Sun Building, Washington, D. C.

Present on behalf of the complainants, Mr. Wilson; present on behalf of the defendant, Mr. Phillips.

Whereupon WILLIAM MAYHEW FOLGER (commodore United States Navy), a witness of lawful age, called by and on behalf of the complainants, having been first duly sworn, is examined.

By Mr. WILSON:

Q. You are the Chief of the Bureau of Ordnance of the Navy Department?—A. Yes, sir.

Q. And have been stationed in this city how long?—A. This last time since October, 1888.

Q. Have you occupied that position since that time?—A. No; I have occupied that position since February, 1890. Previous to that I was inspector of ordnance at the navy-yard, at Washington.

Q. When were you first informed that Ensign Dashiell had designed a breech mechanism for a slotted screw block, with the intention of giving more rapid fire to cannon?—A. I first directed his attention to our not having anything of the kind suitable for use, while I was inspector of ordnance in the Washington yard in the latter part of 1888 or early in 1889. It was, at any rate, in the winter time.

Q. What was his position at that time?—A. He was stationed at the proving ground at Annapolis.

Q. When did you first learn that he had accomplished anything in that direction?—A. I heard from him perhaps from time to time. I recollect certainly of one occasion, while I was still at the yard, when I had a conversation with him as to the progress he was making in the subject, urging him to push along; but the first definite evidence I had that a conclusion might be reached was, I think, in the year 1890, after I came to the Bureau of Ordnance, late in the spring or early in the summer. He then brought me a model, composed of metal and wood, which I took to the Secretary of the Navy.

Q. Can you fix the date any more closely than that?—A. No, I can *not; but it was in* the spring, as I recollect it. It was a month or two *or three months* after I came into the Bureau.

Q. How large was that model?—A. Four or 5 inches in exterior dimensions.

Q. How large a bore did it show?—A. As I recollect, it was an inch and a half.

Q. Had you seen that model before it was finished?—A. No, sir; it was a completed thing when I took it up to the Secretary on that day.

Q. Do you know where it was made?—A. I imagine it was made at Annapolis, as he was stationed there. He told me at the time that he made the most of it himself.

Q. Did he at the same time have drawings of the device?—A. No; he only presented the model.

Q. Was that before or after you first saw the Seabury model?—A. I do not know, to tell the truth. I think it was considerably before; but I am uncertain about that, because the Seabury matter did not occur to me as a very serious transaction at the time, and I did not fix it in my mind. I remember the Seabury matter distinctly, when he and his friend came there on one occasion, certainly; but I am uncertain now as to just when that was. I have had so much else to do that I do not pay much attention to details in these matters.

Q. Are you able to say whether the Seabury model or the Dashiell model was the first that you saw?—A. The Seabury matter came to me long after I first heard of the Dashiell matter, because the Seabury matter came to me when I was at the Bureau.

Q. I am speaking now only of the model.—A. As to that, my impression is that the model came to me before, although I am really very doubtful about it.

By Mr. PHILLIPS:

Q. What model?—A. The Dashiell model.

By Mr. WILSON:

Q. Had you previously to seeing either of these seen any model of a mechanism which unlocked, withdrew, and threw open the screw block by handling a single lever?—A. I have seen the Canet device, which does all of those things, and I have seen many drawings of the Canet device. I had heard a number of years before of the Vavasour device, of a conical breech plug.

Q. You mean that which is made by the Armstrong Company?—A. Yes; that is made by the Armstrong Company. There have been a number of devices of that kind, I think, prior to either of these, because it was by no means a new thought to me, to open it by one movement; but I wanted to do that with an American invention.

Q. I suppose a great many had been striving after the same end?—A. Yes.

Q. The art had reached that stage when the same idea would naturally occur to a great many? I do not mean the same mode of accomplishing it would occur to them, but the same purpose to be accomplished.—A. The desire to do it was universal all over the world. A great many people were trying to do that.

Q. Before the time when you saw either the Seabury or the Dashiell model, had you seen the model of the Canet device?—A. Not his model.

Q. Had you seen it in a gun?—A. I had seen both the Canet and Vavasour in Europe. I have seen a Canet gun in Canet's office in Paris. I was stationed abroad in 1887 and 1888, and I saw that gun in his own office in Paris.

Q. Which Canet device was that?—A. It was one which opened with *one movement.*

Q. Was it one that opened with a lever or one that opened with a gearing?—A. It was one that opened with a lever.

Q. You are quite sure of that?—A. Yes, sir.

Q. Was it patented as early as that?—A. I think so. At least I saw a Canet device in his office in Paris that opened with one movement. You see, these things happened a good time ago, and I do not pretend to recollect exactly about them.

Q. You are familiar with the two Canet devices?—A. I know that he has two; yes.

Q. They are quite different in their construction, are they not?—A. Yes. It is necessary that they should be, as one is intended for a very heavy weight and the other for a light weight.

Q. The one for heavy guns withdraws the breechblock by teeth interlocking with the threads of the interrupted screw, does it not?—A. Yes; I believe so.

Q. And the other one withdraws it by a pin at the rear of the center of the breechblock?—A. I would not attempt to describe it.

Q. Which of these devices do you think it is that is similar to the Seabury and Dashiell devices?—A. I should think it was the lever device that was more similar than the other.

Q. That was the later one of the two?—A. That was possibly the later, but the relative dates of the two devices I do not remember.

Q. Is it not probable that the one you saw in Paris was the earlier one—for heavy guns—first introduced?—A. No; I think not. Canet knew that I was very much interested in all of these things, and he wanted to get them adopted in America. He showed me all that he had. I saw a device there which opened with one movement; it was for a small gun, and naturally would be operated by a lever, and not by a gearing, as would be the case were it a heavy block.

Q. Did he not show you the heavy block mechanism?—A. Possibly; but I remember the other, however.

Q. Was not this heavy block mechanism made with a small gun, in order to show it with the effect of a model?—A. No; we would quickly know whether it was intended for a large gun or a small one, whether the model was large or small.

Q. Then, you think he showed you his small gun lever device, and did not show you his heavy gun and prior device?—A. I think that he showed me the lever device that combined these features of opening in one movement. As to whether he showed me two devices at that time, I do not know. I could not state positively about that.

Q. You can not recall now the precise mode in which it worked?—A. No, I can not. The subject of opening a breechblock with one movement was an old story to me, and I had heard of it in very many different directions before I supposed Seabury or Dashiell were going to do anything of the kind, so that I would not fix in my mind an occurrence of that sort. I may have heard of it fifty times in fifty different directions, as it was a thing I was after myself for—own service.

Q. I would rather you would state how many times you did see it than how many times you might have seen or heard of it.—A. I would be delighted to do it, but I am afaid I would not be able to fix it exactly.

Q. At the time you saw the Seabury model, it did not occur to you that you had already seen Dashiell's model for accomplishing the same *thing?*—A. *It might* have occurred to me.

Q. You can not recollect now whether it did or not?—A. I can not *recollect whether* it did or not. It seems to me, though, that I ought

to have recollected it. Perhaps you can tell me the date that he brought the model there.

Q. The time of which I speak was some time in the month of May, 1890, as I am informed.—A. Mr. Dashiell's testimony will probably fix the date more definitely than mine.

Q. I am only asking for your recollection.—A. I did not bother myself much with the details. I work on a general principle, and someone else works out the questions of details. At that time I was very busy and I do not think I fixed in my mind the date. I should like to know at the present moment, for my own edification, whether Dashiell or Seabury came first with his model; but I really do not know.

Q. You do recollect the fact, however, that you saw both models?—A. Yes; I saw Dashiell's model. I had forgotten about Seabury's model. I have not tried to refresh my mind on this matter, except this morning, when I read over a description of the sequence of events. I had forgotten, until you spoke of it a moment ago, that Seabury did bring a model. I assure you I have not seen either Seabury's drawings or his model, although the drawings were filed—as I understand and know—in the Bureau of Ordnance. I have not looked at either of them since the time of his coming there. I have not seen them, and have not asked for them.

Q. Do you remember the fact that when Mr. Seabury presented the model for your notice, he had with him also original drawings showing the same device for a 4-inch gun?—A. Yes; he had drawings with him, and I think very likely it was for a 4-inch gun.

Q. You did look at them at the time?—A. I looked at everything he had.

Q. Sufficient to observe the character and mode of operation of the mechanism?—A. In a general, cursory way.

Q. Do you know the fact that, subsequently, drawings were received by your Bureau from Seabury? When I say drawings, I should say blue prints from original drawings, showing a 4-inch gun.—A. Yes. I will not state as to the caliber; but I think I remember that there were other drawings received.

Q. I show you these drawings, and ask you if they came from the files of your office in the Bureau of Ordnance [handing witness the drawings].—A. Yes; these are our drawings. This is our method of stamping them. The date is June 4, 1890.

Q. That is, they were received and placed on file in your office on the 4th of June, 1890?—A. Yes, sir.

Q. These are the original receipt marks on the back of the drawings?—A. Yes.

(Counsel thereupon exhibits to the witness three sheets of blue-print drawings, entitled Four-inch B. L. Rifled Seabury Breech Mechanism, sheets Nos. 1, 2, and 3.)

Q. When did you first see these after their receipt in your office?—A. They are usually brought to me. The mail is laid on my desk, and I look at everything. I suppose I saw them that day, when they were received.

Q. Did you give any instructions in regard to them?—A. To be filed, that was all.

Q. Have you, since that time, given any directions in regard to them?—A. I have never thought of them from that day to the time the racket began about them.

Q. Do you know what use, if any, has been made of them from that time?—A. *They can not be taken from the file without my permission. That is the order.*

Q. They can be taken within the limits of the Bureau without your order?—A. Yes; by any of the assistants of the Bureau.

Q. I ask you, from the appearance of them, whether you would say they had been handled since they were received?—A. I don't know about that. Their condition might have arisen from the condition they were in before they were received. As to whether they have been handled since they were printed, I say yes.

Q. They have been handled a good deal, have they not?—A. Yes; but as to when they were handled, as to time and place, I should be very doubtful.

Q. In fact, they show signs of wear, do they not?—A. Yes; but they may have been worn before they were sent to us.

Q. If they were entirely fresh when they came to you, it would indicate that they had been used a good deal in your office.—A. They would indicate that they had been used, if they were fresh when they came to me, unless means were taken to crumple them up.

Q. They have remained since then in the files of your office?—A. No, you have just received them this morning.

Q. They were just handed to me by Mr. Stayton, accompanying Mr. Dashiell, who, I believe, brought them from the Bureau of Ordnance.—A. Yes; I think that is very likely true.

Q. I understood you to say that they had not been permitted to go out of the possession of your Bureau.—A. I have given no permission for them to go out, and I do not imagine that they have been taken out.

Q. Did you not say they could not go out without your permission?—A. They can not go out properly without my permission.

Q. Can you give any explanation of the pin holes that appear on sheet No. 1?—A. I can not. I have had nothing to do with them.

Q. You see such pin holes there?—A. I see there are holes there. There are more or less pin holes in all of the sheets.

Q. How are those ordinarily made in such drawings?—A. Pin holes are not supposed to be made in the drawings. If you are going to trace a drawing, it would not be done by means of making pin holes in them like children do in school. They put pin holes in the corners, and lay the tracing paper over it.

Q. How did the pin holes happen to be in these drawings?—A. They occur in taking dimensions, etc.

Q. That is, by the points of the dividers?—A. By the points of the dividers.

Q. When did you first see any drawings of the Dashiell device for handling the screw block?—A. I think in a drawing for the Secretary's report, in the fall of 1890. It is very likely that I saw and approved detailed drawings between the summer of 1890 and the fall of 1890. I must have done so, because they can not manufacture a mechanism at the Washington yard unless I have my signature on it. I recollect that there was a picture of the device put in the Secretary's report of 1890, or, at any rate, it was the intention to put it there. If it is not there, there was a change in the intention. I must have seen the drawings of the Dashiell mechanism during that summer, and approved of them, for their manufacture; but I do not remember specifically the date at which I had these drawings brought to me.

Q. Were those drawings entirely similar to the mechanism shown by the model you had already seen?—A. They were, in principle, *undoubtedly.*

Q. Were they in detail, or were the details modified?—A. I think *that always grows*——

Q. I am asking you about this particular one?—A. I do not know about that. I fancy they were changed.

Q. Were those drawings made in your Bureau?—A. The detail drawings are usually made at the yard. The general drawings are made at the Bureau.

Q. And by Bureau draftsmen, at both places?—A. Yes, sir.

Q. The drawings of which you speak, then, were made by some of these draftsmen from original sketches furnished by Dashiell?—A. Yes; they are usually made from original sketches of the designer.

Q. Your report for the year 1890 speaks of the invention of Dashiell, does it not?—A. It probably does.

Q. And refers to the delineation of it, which will be figured in the appendix. Is not that the fact?—A. Possibly it is. I have not read it since 1890.

Q. Was it figured in the appendix?—A. If I said so I trust it was, because that was the intention.

Q. If it was not, what was the reason?—A. Probably because the Secretary would not approve of making any drawings, or something of that sort.

Q. If that is not the case, then, what would be the explanation?—A. I do not know whether there could be any explanation of it. It would not amount to anything deep or mysterious.

Q. How many times were Dashiell's drawings changed before that type was generally adopted which took form in the first breech mechanism actually applied to guns by your Bureau?—A. I have no idea. I did not pay any attention to these details.

Q. Did you not have something to say about it?—A. I authorized all changes; but as I have about 5,000 drawings going all the time, I can not follow them all. If I had known there was to be a controversy, probably it would have fixed it in my mind.

Q. Then no changes were made without your authority?—A. No changes are ever made without my authority.

Q. Were changes made upon your suggestion?—A. They may be made upon my suggestion. They frequently are.

Q. I am asking about this particular case?—A. I do not remember whether I made any changes or not. I may and may not have done so.

Q. Did you not, in point of fact, suggest various changes?—A. No; not in the Dashiell mechanism. That is a thing that I had confidence he would work out to my satisfaction better himself than he would by any advice from me.

Q. Was he an assistant in your Bureau?—A. No; he was stationed at the proving ground at Annapolis.

Q. Was he an assistant in your Bureau any part of the time while you were Chief of Bureau?—A. No; never since I have been Chief of Bureau.

Q. When was the application first made for the Dashiell patent?—A. I have no definite idea.

Q. Did you know anything about it at the time?—A. I advised him to take out a patent.

Q. When did you do that?—A. In 1890. I counseled him to take out a patent. I thought it was a good thing for him to do, and it was, in my opinion, an original departure.

Q. A departure from what?—A. An original idea, we will say.

Q. What did you regard as the feature of originality in it?—A. It was different from anything I had seen before, in general.

Q. *Different from* the Canet?—A. It was prompter in its action than

the Canet. It was somewhat more powerful than the Canet, and its extraction was, as I thought, better than the Canet.

Q. You considered it to be considerably different from the Canet?—A. I considered it substantially an original idea, and I thought it would be advantageous to us to have an American idea.

Q. If you considered it an original idea, you considered it substantially different from the Canet; is not that the fact?—A. Yes; if the Patent Office should decide that it was sufficiently original to award a patent on it I would be satisfied to go on with it.

Q. You were aware at that time that Seabury's invention had already been patented?—A. I was aware that there was a similarity between them, but I did not know any more about the Seabury patent than about the other.

Q. You knew the Seabury invention had been patented at the time you first saw the model of the Seabury invention?—A. I suppose I knew it.

Q. Do you not make it your business, as Chief of the Bureau of Ordnance, to keep yourself informed as to the issuance of patents in the matter of guns?—A. We receive notice of patents, and of all patents that are filed in the American office. That is to say, there are instructions at the Patent Office to furnish us with them, in a general way, and specifically with regard to certain things, and they keep us pretty well posted as to what is being done. I probably knew at the time Seabury presented his model that he had a patent.

Q. Then, if his patent had been issued some time prior to that, you must have known it in the course of business?—A. That is probably true; yes, sir.

Q. Did it strike you that the Dashiell design was original, in that it was substantially different from the Seabury design?—A. I did not bother much about the two. As I told you a moment ago, I never looked at the Seabury drawings or model after Mr. Seabury presented himself there. I made no study of them whatever. I went largely on this principle, that if the Patent Office, which was paid for making validity searches, and things of that sort, had satisfied itself of the originality of the idea, I had nothing further to do with it, and did not care.

Q. You said a few moments ago that it was your desire to have an American device that would perform this function of rapidly opening the breech?—A. Yes; in the best manner possible.

Q. And was it not present to your mind that the Seabury device, already patented, accomplished that, and was an American device?—A. Yes; but not so well. The impression in my mind at the time was that it did not accomplish it so well. I remember of this expression being used at the Bureau at the time with reference to Seabury's device. The term applied to a complicated mechanism is a "clock;" and I remember somebody said at the time of the presentation of the Seabury device that it was a sort of clock; in other words, that it was somewhat complicated. I remember that the impression produced upon me by the Dashiell device was that it was less complicated. That, together with the issuance of the Dashiell patent, or the prospective issuance of it, was probably the cause of any action in taking it.

Q. You did consider the question, to some extent, as to whether the Dashiell device was an infringement on the Seabury device?—A. It pos*sibly may have* occurred to me.

Q. Did it not occur to you?—A. I think it is very possible it did.

Q. Is it not more than possible? Is it not your present recollection

that you did think of it?—A. Not as a definite and specific fact. The decision of the Patent Office, I thought, rather cleared the atmosphere, so far as I was concerned.

Q. What was there in the atmosphere to clear up?—A. There was the Canet device, and all that had been done before, and the desire that the Bureau should not have a fight on its hands.

Q. Did you request any opinion or decision from any of the Patent Office officials upon that point?—A. Not at that time. I never did on Dashiell's matter. I did on another matter, however.

Q. Did you see Dashiell's drawings and application as presented for a patent?—A. No; I did not see it at all. In fact, in order to preserve to himself the right to receive a royalty from the United States, if it was decided to give him a royalty, he showed me nothing about his patent claims or his patent drawings prior to his application for a patent. He very wisely did that without consultation with me in regard to it, and I was subsequently very glad that he had done it. He took what measures he could leading to the issuance of the patent without consultation with me and without advice from me as to modifications or details, and secured his own patent in his own way, in order that his claim for a royalty subsequently might be perfectly clear, because the rule, as I understand it, as decided by the Attorney-General and by the Supreme Court, is that if he receives assistance or pay, or the Government develops his idea for him prior to the main principle being established, he can not receive a royalty. He did not do anything that would invalidate his possible subsequent claim for a royalty.

Q. That is, he did not in your judgment?—A. So far as I am able to judge.

Q. Were any obstacles developed in the way of his obtaining a patent as originally applied for?—A. I have no knowledge of any of the proceedings in the Patent Office.

Q. There was no conference with you at any time between the application for a patent and the issuance of it?—A. None whatever, as I recollect.

Q. And in the meanwhile your Bureau proceeded to manufacture this device?—A. That is just what we did, because we were in a great hurry.

Q. How many of these devices have been completed or are in process of construction in your department?—A. I do not know that. We can find out if it is necessary.

Q. As many as fifty?—A. Yes.

Q. As many as a hundred?—A. I do not know whether we have gotten up to a hundred or not. My annual report states it, but I do not know now.

Q. You would say somewhere between fifty and a hundred?—A. Possibly more and possibly less.

Q. Was there a time when work was suspended at the navy-yard shop?—A. No, sir; not that I know of. I do not recollect that we ever held it up. Do you mean on account of this interference?

Q. I ask simply whether there was a time when work was stopped for a while?—A. I think not.

Q. Is it not a fact that for several weeks and even months, that work was suspended?—A. On the Dashiell block?

Q. Yes.—A. I think not. I do not remember at this moment.

Q. You would not be positive that it was not?—A. I am rather positive that it was not. I have never cared enough about this thing as to have taken so serious an interest in it as to recollect all the details.

I was away for a month during the summer, but I think I would have known it if it had been stopped. That would indicate that we were rattled, and we were not at all.

Q. This is your letter, I suppose [handing witness a letter]?—A. That is my signature and my letter.

Mr. WILSON. I offer this letter in evidence.

(The above-mentioned letter is here offered in evidence on behalf of the complainant, and the same is filed herewith and marked "Exhibit W. M. F. No. 1.")

Q. Is this also your letter? I show you a paper already marked "Complainant's Exhibit Letter No. 1, S. A. B., commissioner."—A. Yes; and that is my signature.

Q. At the time the Seabury model was shown to you first, did your Bureau have any rapid-fire device before it for consideration?—A. The Driggs and the Hotchkiss device were adopted in Europe, and we did not know but what we might have to take that. I did not want a block that moved up and down, if I could help it, and I was looking for something else. Sicard had rather believed that the Driggs block might be applied to a 4-inch gun.

Q. Sicard was your predecessor as Chief of Bureau?—A. Yes, sir.

Q. At that time the question of adopting the Driggs device was more or less undecided?—A. Entirely undecided; it was never decided to adopt it, and it has not yet been adopted.

Q. And with the exception of that there was no device that was actually under formal consideration, was there?—A. Admitting that I had not seen the Dashiell block, which I am not quite certain about, there was none other.

Q. Then if you had not already seen the Dashiell model there was nothing before your Bureau except the Driggs-Schroeder device?—A. Nothing except the Canet, the Hotchkiss, and the Driggs-Schroeder. I had only been in the Bureau a little while, and was, of course, looking around very interestedly and seriously as to where I was going to settle. It was a matter involving a good deal of money, and I was taking up for consideration anything that came along in that line, and to that extent I did take up the Seabury, but never with a view to committing myself to any extent.

Q. If you had already seen the Dashiell device, you did not mention that fact to Seabury?—A. I would not have been apt to mention it. I will tell you one thing which may be of interest to you. Mr. Seabury has taken out a great many patents, and has been several times offered duty in the Bureau of Ordnance. He has always declined it. If some other device had come before me as Chief of Bureau my sympathetic consideration would be with the other naturally, if the merits of the other device at all made such a decision justifiable, on account of Mr. Seabury never having been willing to work in the Bureau of Ordnance.

Q. When was he ever offered an assignment to that Bureau?—A. He was offered it in Sicard's time, and he was offered it in my time. It seems to me that I offered him a position before I became Chief of Bureau. I think I suggested his going into the Ordnance Bureau. I remember suggesting a great many times, when he was aid to Admiral Porter here, that he should do so, but he never did. He is always inventing, and is a man of a good many ideas.

Q. Do you mean to say that you ever actually offered Lieutenant Seabury a position in your Bureau?—A. I suggested it.

Q. *Did you* ever offer it?—A. No; I made no particular offer, but I *suggested to him it* was a great pity he was not in the Bureau of Ordnance, because he could make his talents of greater value.

Q. Is that the suggestion you refer to?—A. That is, possibly, the suggestion I referred to.

Q. With that exception, did you ever offer or suggest to him that he should be detailed to your department?—A. Several times when I was on duty in the Ordnance Department I can remember of speaking to him, and I can remember of having heard that Captain Sicard had offered him duty there.

Q. Do you know of your own knowledge of Captain Sicard's having made such an offer?—A. No; except that the matter was Bureau talk.

Q. I am asking you for your personal knowledge. Bureau talk is not evidence.—A. I am giving you, however, my general impressions of this young man.

Q. I will limit you, for a moment, to your own knowledge. You have no personal knowledge of Captain Sicard's ever having offered Seabury duty in the Ordnance Bureau?—A. Not beyond hearsay; no.

Q. You do not consider that personal knowledge, do you?—A. No.

Q. Limiting you in the same way to your personal knowledge, did you ever offer Lieutenant Seabury duty there, or suggest to him that he should be attached to your Bureau, with the exception of the suggestion you made when he showed you his model of the breech mechanism?—A. No; probably not.

Q. And on that occasion did you not simply say: "You ought to have been attached to this Bureau?"—A. Possibly. The suggestion was that it was a pity he was not on duty in the Bureau.

Q. And for the reason that he was not, you would receive the device of anyone else with more favor than his?—A. For the reason that, to my own knowledge, he has had a long history of making inventions of war materials away from the Bureau of Ordnance, and in the matter of patents, which we deprecate as a rule.

Q. You did not deprecate it in Dashiell's case?—A. No, sir; because the services of Mr. Dashiell should be paid for.

Q. You advised it in Mr. Dashiell's case?—A. No; I gave no advice whatever.

Q. You recommended him to do it?—A. I told him I hoped he would take out a patent.

Q. You think he was wise and right in taking such a course?—A. Yes, sir; I say that certain officers have served the Government of the United States to such an extent that the Government should pay them in one way or another. Their pay is not sufficient, and they can not make any money in the service. When this officer, without order or instruction from me as to the evolution and development of a device, produces a thing which the Patent Office states is original in idea, and which is, in my opinion, different from and better than anything that has been presented to me, I say to that officer, "Take out a patent, because your services have been so good that you should receive some remuneration for them." That is the case here, and that is why this officer had my sympathetic consideration all through; but he has had only that, however.

Q. On principle, you are ordinarily prejudiced against an officer who takes out a patent for his invention?—A. On general principle, in the case of an officer who has not given services to the United States, I am opposed to their taking out a patent. I myself have never taken out a patent of any description, and I have probably been connected with the Ordnance Department more intimately than any other person in the Navy at the present time, not excluding my predecessor. When an officer is not on duty it is quite another matter. When an officer is

on duty I deprecate his taking out a patent; but there are certain cases where an officer's services have been of such a nature that the Government can not reward him. When his services have been very great and of a meritorious character, then I want to see him receive some remuneration, on general principles of equity. I tell you frankly, and it is only human, that I look upon the production of that officer with more sympathetic consideration than I do upon the production of an outsider and free lance, who comes in for the pelf alone, for mere money-making business, without having given any previous service, remembering all the time that the interests of the Government are guarded by the adoption of the better device. I am thoroughly convinced Dashiell's is a better device. The Patent Office tells me it is an original one——

Q. In what way do they tell you that?—A. They grant him a patent on the mechanism.

Q. That is your construction of the patent?—A. That is my construction of the patent.

Q. This letter of yours, under date of September 29, 1890, which was shown you a few moments ago (marked "Complainant's Exhibit Letter No. 1, S. A. B.") and addressed to Lieutenant Seabury, contains this language: "While recognizing the merits of your design, the Bureau has other designs developed by its assistants which it considers superior in some respects." What other designs did you refer to in that expression?—A. To Mr. Dashiell's.

Q. To how many designs of Dashiell's did you refer?—A. That is merely a form of expression.

Q. Although you used the plural, you meant it in the singular?—A. I may have done so.

Q. What is the fact?—A. I do not know. People write letters for all sorts of purposes. I may have had knowledge of other designs than Dashiell's. I do not know whether I did or not, but I probably had Dashiell's design in my mind at the time.

Q. You did not design to convey an erroneous impression?—A. I did not design to convey an erroneous impression.

Q. You used this expression in regard to the Seabury device, "your design," and in regard to the Dashiell device you used the words "other designs." Why did you use the singular in one place and the plural in the other?—A. I do not remember.

Q. Can you give any explanation of it now?—A. No. I may have had something else in my mind besides the Dashiell device; but I particularly, however, referred to Dashiell.

Q. Were there any other designs under consideration which you considered superior to Seabury's except Dashiell's?—A. I do not remember now whether there were or not.

Q. Did you have any other device before you for handling a slotted screw with rapid-fire mechanism?—A. Canet's was before us in a general way, and I believe there is one design in the Army that opens with one movement, which had been gotten out at that time.

Q. Whose invention is that?—A. I do not know whose it is.

Q. I am speaking now as to the date of September 29, 1890.—A. I will tell you now specifically that I may have had in my mind the intention of producing on that young man's mind the idea that I had more than one string to my bow. You understand that in writing letters as people write letters it is very probable that I may have used the plural *designedly* at that time, but I specifically had in my mind the Dashiell *mechanism*.

Q. You thought you might produce that impression upon Seabury's

mind—that you had two strings to your bow when you only had one?—A. Possibly.

Q. Let me call your attention to this letter. The words are "other designs" developed by its assistants. Does that refer to Dashiell?—A. Specifically, as I recollect now, it meant Mr. Dashiell more than any other. I may have directed, and possibly I had at that time directed, Mr. Fletcher to look up the subject of rapid-fire mechanism.

Q. Would the word "developed" apply to such a case as that?—A. Yes; perfectly so.

Q. Do you not understand the word "developed" to be in the past tense?—A. If you will give me the sense in which it is used there I will tell you.

Q. I ask you if the word "developed" is not a word in the past tense?—A. I believe it is.

Q. Where it stands alone?—A. Yes.

Q. Then, when it stands alone, it speaks of something which has already been done, does it not?—A. I suppose so.

Q. Were there any other designs than Dashiell's that had at that time been developed by the assistants of your Bureau?—A. It is possible that I might have had my assistants working at that time on some other design besides Dashiell's. The difficulty, however, as I remarked before, is that I meant Mr. Dashiell's design more than any other.

Q. You have no present recollection of the fact that there was any other design intended to be referred to in that except the Dashiell design?—A. No; probably not.

Q. In what way was the Dashiell design developed by the assistants of your Bureau on September 29, 1890?—A. He is an assistant in the Bureau, in that he is under the control of the Bureau, although not actually detailed for duty in the Bureau.

Q. Who is?—A. Dashiell.

Q. How many people do you count Dashiell?—A. He is but one.

Q. What do you mean by the word "assistants" in the plural?—A. That is used in the same way. I will repeat to you a remark I made to you a moment ago. Desiring to produce the impression on this young man, that I possibly might have more strings to my bow, and in order to close off the communication with him more definitely than I would by simply stating it in the singular, I may have worded my letter in that way. As to my actual intention at that time, five years ago, I am not now quite certain.

Q. By "this young man" in the last answer, you mean Lieutenant Seabury?—A. Yes, sir.

Q. Do you know his age?—A. No; but he is pretty nearly as old as I am, I fancy. He is young in the sense of the naval expression.

Q. Did any of the assistants in your Bureau have anything to do with developing Dashiell's device?—A. None of my assistants specifically stationed in the Bureau or elsewhere had anything to do with the development of Dashiell's device. But I consider that my assistants in Hartford, and my assistants in Wilmington, Del., and my assistants in fifty other places are all, for general purposes, and for labor of a general character, assistants of the Bureau.

Q. Did they have anything to do with the developments of Dashiell's device?—A. I do not know of anybody but Dashiell working on it at all.

Q. At the time of this letter, September 29, 1890, had you decided to adopt the Dashiell device?—A. I had decided to adopt it for trial, probably, at that time. It was sufficiently advantageous for me to adopt it for trial; but such a thing as that is rarely adopted until after it has had a year of test.

Q. At the date of this letter, had the Dashiell device been completely matured and developed?—A. Nothing is completely matured and developed of that description. It will probably go on improving for three years from the time of its original inception.

Q. Was it so far matured and developed as to leave it in a condition for you to begin the work of constructing such a breechblock and applying it to one of the guns?—A. Yes.

Q. Had it reached that stage of development?—A. It must have reached that stage when I wrote that letter, or I should not have written it.

Q. There is always a possibility of improvement in any device as to the practical working of it?—A. Yes; there is rarely one that does not continue to improve.

Q. Between the time of this letter, September 29, 1890, and the present time, there have been further developments in the Dashiell device?—A. Yes; in minor improvements. The principle is the same, but minor improvements are constantly going on.

Q. I show you a copy of the Dashiell patent, with the drawings attached, and ask if you can point out any difference between those drawings and the structure of the Dashiell model as you first saw it?—A. No; I could not do so, to save my life.

Q. Can you say whether there is a difference or not?—A. I can not, because I no not remember. I do not pay much attention to details.

Q. How do you ascertain the merits of such things without paying attention to details?—A. I look into the general principle, and I know enough about mechanism to decide promptly, on a cursory glance, as to the general principles, and as to whether there is promise in the device or not. As to studying out the intricacies of every mechanism that comes to me, I would have to have a great many more hours in the day than there are to do it.

Q. In other words, your mind is so trained on that subject that you can take in the principles and salient features in a very short time, can you not?—A. I think I can say, without vanity, that I can decide quickly, having seen a great many mechanisms before. If there is any novel, advantageous, or meritorious feature about a mechanism I can decide quickly with reference to it; but as to my going into exactly the details as to every screw, or nut, or worm gear, or something of that kind, and working it out as the man who makes it would, I do not do that. I could not tell now by looking at the present Dashiell device what improvements have been made over the original, because I do not care for those things. I have too much to do.

Q. Without going into details, I ask you if the original model was substantially in the same form shown by figures 1 and 2 upon this copy of the Dashiell patent No. 468331?—A. Substantially, in principle, I should say that it was.

Q. Did it have the handle and lever marked 15 and 14 in the same position, or substantially the same position, as applied to the gun?—A. Yes; I fancy it did, so far as I recollect. I have not looked at the drawings for a long time. It was substantially in the same position.

Q. I am not asking as to the correspondence between the patent and the guns that it was applied to, but the correspondence between the patent drawings and his model which you saw?—A. I do not remember about that with any certainty.

Q. Is that model in existence?—A. I do not know that. I have not seen it for years.

Q. Did you handle the model?—A. Yes; I took it up and showed it to the Secretary the first time I ever saw it.

Q. You opened it, closed it, and saw how it worked?—A. Yes; and the Secretary opened it and closed it.

Q. You saw how it worked?—A. Yes, sir.

Q. That was Secretary Tracy?—A. Secretary Tracy. We were both very much pleased and delighted with the simplicity of it. The simplicity and novelty of the device was as marked at that time over the Seabury mechanism as anything in the world. I do not remember any of the details about the Seabury mechanism; but there was a general impression given of complication, number of parts, and clockiness about it.

Q. At the time you wrote this letter of September 29, 1890, you had seen the Dashiell model?—A. Yes; at that time I had seen it. I think that letter indicates it.

Q. And I presume you have seen the Dashiell drawing and designs?—A. Yes.

Q. With the view to the application of the mechanism to an actual gun?—A. With a view to the manufacture of the actual mechanism at the yard.

Q. What reason did you have for not stating that the Dashiell device was the one you referred to?—A. Because it was not material. I want to tell you another reason which affected me at that time. There was a general talk about price with Mr. Seabury. His price was $250 for each mechanism. Mr. Dashiell's royalty, if one could be allowed, was to be $125 each, just one-half of that amount. That was another reason, probably, that made me act in this way.

Q. How did Dashiell's price come to be fixed at that sum?—A. I suppose he heard the other price and said that he would do it for half the money.

Q. How did he hear of the other?—A. There is a contract on file, probably at the Interior Department, with the Driggs folks for $250 each, made by Captain Sicard, and Mr. Dashiell had probably found out what that was. It was in the line of that amount that Mr. Seabury proposed $250 each. He probably learned of it in the same way. He may have learned of it from me.

Q. Is it not a fact that he did learn of it from you?—A. Very possibly.

Q. Did you not send out and get the contract while Seabury was at your office to see whether that was the sum?—A. Very possibly. I do not remember about that.

Q. At that time you did not make any objection to the figure in your talk with Seabury?—A. Our talk was of a general character.

Q. Did you make any objection to that figure as being unreasonable?—A. I may have and I may not have made any objection. I do not remember.

Q. You do not remember that you did?—A. No.

Q. When was the contract made between your Bureau or the Navy Department and Dashiell for a royalty to him?—A. That was probably made in the latter part of the year 1890. I do not remember the date.

Q. Was it brought about through your interposition?—A. Yes.

Q. Did you propose it to the Secretary?—A. Yes; I have to propose these things before they can be approved.

Q. Did you propose it to Dashiell?—A. I think probably he proposed that price to me.

Q. Did you not propose the matter of a contract to him?—A. He has to have a contract, or he never could get any royalty.

Q. In fact, did you not propose it to him?—A. Possibly I did. I suppose so.

Q. You suppose you did?—A. I think it is likely.

Q. When was that?—A. It may have been 1890, before we actually began the mechanism. It would probably have been at that time. You must recollect that you are talking about something the details of which are all present to your mind, and you are recalling something to me which did not produce any serious impression on my mind, because I did not expect any row in regard to the matter. It was in the natural and ordinary course of business that we did these things. We are doing them all the time. Our memory is somewhat defective, because we have so many of these things to do. I have no doubt a great many people could bring me up and say: Did you notdo so and so, and I would be unable to tell exactly about it. I have to depend on our correspondence and files to tell, so far as may be, exactly what occurred. This is but one thing in five hundred that I am doing in the way of appropriating mechanisms in various directions.

Q. What do you mean by the word "appropriate?"—A. Acquiring for the benefit of the United States as far as possible.

Q. And with as little pay as possible?—A. Just as little pay as possible every time.

Q. And you say this is one of five hundred such cases?—A. It is probably one of five hundred such cases in which I have had to consider the drawings, but I have not taken that many of them perhaps since I have been chief of the Bureau. I should say, however, that I have considered at least five hundred.

Q. If you have the disadvantage of having a great many transactions in your mind you certainly have the advantage of having been a party to them and thereby having an opportunity of acquiring personal knowledge of them, have you not?—A. Yes; but they come and go so rapidly that it is a very difficult matter to recall the details, dates, and features of each year's afterwards. I can not keep the details in my mind. I could not describe the Seabury mechanism if you asked me, to save my life. I never looked at it after these visits to me.

Q. Do you mean that your recollection is poor in regard to this transaction generally?—A. No; not as to this transaction. It is poor in regard to all transactions of that nature.

Q. How is it in regard to this particular transaction? If you recollect this clearly it is entirely immaterial whether you recollect the other matters or not. Do you recollect this transaction clearly?—A. You must have observed that my recollection is quite cloudy about dates.

Q. You wish to be so understood now?—A. Perfectly so.

Q. Can you or can you not state whether it was in 1890 that the contract was made with Dashiell?—A. No; I can not state. I do not know that it was not 1891 before we made the contract.

Q. Was it made as early as 1891?—A. I had asked the Attorney-General whether I could give him a royalty.

Q. Was it as early as 1891?—A. I could not say.

Q. Did you apply first to the Judge-Advocate-General for an opinion?—A. I think the sequence of the events was to ask the Secretary of the Navy to have the Judge-Advocate-General ask the Attorney-General.

Q. Had the Judge-Advocate-General previously rendered an opinion?—A. I do not remember. I am not certain whether he did or not. I do not think he did, because he did not know anything about these *things.* We did not have much confidence in his opinion, and I prob*ably asked to* have the Attorney-General decide as to whether we could *pay a royalty* under the circumstances.

Q. Did you never make distinct inquiry of anyone as to whether the Dashiell device could be regarded as an infringement on the Seabury patent?—A. No; I do not remember of ever asking anyone for such an opinion.

Q. Did you not ask the question on one occasion in the room adjoining the room of the chief clerk of your Bureau when Lieutenant Fletcher was present?—A. I may or I may not. You know we talked casually about these things.

Q. Did you not then raise the question whether the Dashiell mechanism could be made safely without infringing the Seabury patent?—A. It is possible I thought of that a great many times.

Q. Did you not ask that question?—A. I do not know whether I did or not.

Q. In the presence of Lieutenant Fletcher and others?—A. I do not know whether I did or not. It is very possible that I did. It was naturally the subject of conversation.

Q. Were you not told, in response, that it would be such an infringement in the opinion of that particular person, whoever he was?—A. No; I do not remember of ever having heard that. I am perfectly ready to state that neither Mr. Fletcher nor anyone else has ever expressed a definite, positive opinion that the Dashiell mechanism was an infringement. I have never had such an opinion except from Mr. Seabury. I have never had a distinct, positive opinion that the Seabury mechanism was an infringement of the Dashiell, or vice versa.

Q. You mean you have never had that opinion expressed to you by anybody?—A. Yes.

Q. You are absolutely positive about that?—A. Yes; I am absolutely positive about that.

Q. Are you equally positive that you never said you would use the Dashiell, whether it was an infringement or not?—A. I am absolutely certain that I never have said any such thing.

Q. If I understand you aright, you took no advice as to whether the making of the Dashiell mechanism would be an infringement of the Seabury patent any further than as you have yourself interpreted the patent issued to Dashiell?—A. No; I never took any advice on that subject. I went right ahead and made it. If there is an infringement, there is a recourse to the Court of Claims to settle it.

Q. Then you did not trouble yourself particularly about questions of infringement?—A. I do not, as a matter of fact. I advised Dashiell, and advised the Secretary of the Navy, in our conversation, to let it go before the courts to be settled; that I did not care anything about it, and was not going to look into it myself; that I would rather have it go before the courts than not. I remember of Dashiell saying to me, that he preferred that this thing should go to the courts and be settled in that way.

Q. What time are you now speaking of?—A. I am talking about the time that Seabury first made his objection to Dashiell getting the royalty. Dashiell has never received a penny of royalty on his invention yet, the Secretary having stopped it pending this case. That was when the Seabury people first began to write letters to the Secretary of the Navy.

Q. Then it is your policy to make whatever you please, in your Department, and leave anyone whose patent may be infringed to resort to the Court of Claims?—A. No; you are inventing a course of conduct which we do not pursue.

Q. That is the course you pursued in this case?—A. No; let me state

it as I want to state it. My plan in this case was to urge the Secretary of the Navy to let us go on and make the mechanism, and let the law courts decide the question of infringement; that they would have recourse for their rights, if they had any, in the Court of Claims. That is a very fine thing for you to suggest to me to say, but that is not my principle.

Q. I understood you to say that you did not concern yourselves about questions of infringement?—A. In this particular case I did not take time to look into it, because I was perfectly convinced that there was no infringement, so far as my own somewhat uninformed judgment was concerned.

Q. When were the first drawings made of the Dashiell mechanism in your Bureau?—A. They were probably made somewhere near the date of that letter. The general drawings would be made in the Bureau, and then they are sent to the yard for detailed drawings of the parts. They were probably made in the fall of 1890, although I do not remember anything very definitely about them. The letter fixes it somewhat in my mind, because after I came to a decision I wrote that letter. The decision was arrived at after a consideration of the drawings or of the designs.

Q. Do you remember the fact that the Dashiell patent was not issued until February, 1892?—A. I had no knowledge of the details as to what occurred with regard to the issuance of the Dashiell patent or anything that occurred during his efforts to obtain a patent. He confided nothing whatever to me on the subject. I counseled him nothing in regard to it, and knew nothing whatever about it, and cared less.

Q. When did you examine Dashiell's patent for the purpose of forming your judgment as to how far that protected his manufactured device?—A. I did not examine it particularly. I was delighted with the model. I saw that it had less parts; that it was more powerful and did the work better than anything that had been hitherto brought to my notice. His patent was probably put in the file on my desk, as sometimes there are a dozen of them laid there, but I, perhaps, did not read a line of it. The fact of his getting a patent was sufficient to clear the atmosphere for me and permit me to go ahead. The United States Patent Office stated that there was an original idea there, and I went ahead on that.

Q. You went ahead on that?—A. I went ahead largely on that fact.

Q. Relying on that?—A. I probably had gone ahead before, but I felt confirmed in the justice of my course by the arrival of the patent. Probably I had been going ahead for months before that, and no doubt I had, because I supposed that Dashiell held his patent back on account of foreign patents or something of that sort.

Q. That period is only for six months?—A. You mean as to holding back?

Q. Had you gone ahead prior to that six months?—A. I suppose so; I did not pay any attention to these dates.

Q. Then in what you did before you were informed that a patent had been allowed you did not, of course, rely on the patent at all as protecting anybody against a claim of infringement?—A. No; I did not have time to wait. We are too hard pressed to get mechanism.

Q. Up to the allowance of the Dashiell patent you had no assurance whatever that the Dashiell mechanism might not be an infringement of *Seabury's*?—A. As to the question of infringement, it did not occur to *me at all.* It never came near me as a serious question.

Q. *You have no* recollection by which you can fix the date when you

first knew of the allowance of the Dashiell patent?—A. No; I did not pay any attention to it and did not care anything about it.

Q. I think you said a few moments ago that you did not read a line of the Dashiell patent?—A. I probably did not. I may have, but I do not recollect whether I read it or not.

Q. You relied on the fact that there was a patent?—A. Yes; that confirmed me in the justice of whatever course I may have taken up to that time, and I felt that we were out of the woods so far as there was any trouble on that subject, if I thought of it at all. That cleared up the atmosphere.

Q. What was it that, up to that time, had clouded the atmosphere and made you feel that you were in the woods?—A. There were a lot of people working on the general subject of mechanism of the general type of the Dashiell.

Q. Who else besides Dashiell?—A. I mean Dashiell and Seabury.

Cross-examination by Mr. PHILLIPS:

Q. Since you have been Chief of Ordnance an unusual call has been made upon you to supply the service with rapid-fire guns of the breech-loading pattern?—A. There has been more than that. There has been a necessity that the batteries of these new vessels should be tested and that a sufficient number should be manufactured to arm the ships as fast as they were completed. There was no time for delay. Decisions had to be made with the greatest rapidity, and we frequently ran some risks as to the ultimate outcome, as regards the efficiency of the design.

Q. Since you have been Chief of Ordnance an unusual call has been made upon you to supply the service with rapid-fire breech-loading guns?—A. Yes; on account of the construction of a great many new naval vessels.

Q. As between the Seabury and Dashiell improvements, you regarded the latter as superior in regard to strength, simplicity, and ease of operation?—A. That was my opinion at the time I decided to take the Dashiell mechanism instead of the Seabury.

Q. These qualities of strength, simplicity, and ease of operation are first-rate qualities under the circumstances?—A. They are first-rate qualities for such a device.

Q. Any question of law as to the respective mechanisms you left to the decision of the Patent Office?—A. I left that to the decision of the law officers of the Patent Office.

Q. The element of preference for the invention of an officer who was an assistant to your office and one who was not, was limited to cases where two inventions were otherwise of equal merit, and would not have influenced you to prefer an inferior mechanism?—A. No; the public service is guarded, and these mechanisms are adopted as the result of the action of a board of officers, and not by the fiat of the Chief of Bureau. They are invariably adopted as the result of a report of the board.

Q. Such preference by you would be limited to a case in which the interests of the public were not concerned in any decision that you might make thereupon?—A. I would be guided by the public interest more than by anything else.

Q. You said in your examination in chief that, because Seabury had occupied certain relations to the office, you preferred, as between him and somebody else, the other person?—A. Yes; if the mechanisms were equal I should prefer somebody else, and if the other were superior I certainly should prefer that.

Q. You would not exercise that preference in a case where the interests of the public were concerned?—A. No, sir; the interest of the public is the first thing we have to guard, because we are checked by public opinion and by the subsequent performance of the mechanisms. If it is a good thing, it will work its way to the front in spite of decisions by the Bureau.

Q. You regard the superiority of the Dashiell device over the Seabury clock, for the purposes of the service, as clearly appearing on the face of the drawings?—A. At the time of my decision I certainly so regarded it. I do not know how the Seabury device may look at this time.

Q. As between the two patents you regarded the Ordnance Bureau as entitled ordinarily to decide freely, without being liable to any charge of neglect of duty, and that the parties concerned have recourse to the law courts in order to establish their claims, if there be any?—A. As between two patents I consider that the Bureau of Ordnance has a perfect right to choose to suit itself. Of course, every man has recourse to the courts.

Q. You had some assurance, at the time you commenced the manufacture of the Dashiell gun, that the patent was to be issued?—A. I do not remember that I had any assurance of it. I supposed that it was a new thing, and that he would secure a patent upon it. I had no assurance that it was to be issued from any source whatever. I had paid very little attention to that. I wanted him to have a clear field, so that he could state that he had no assistance from the Bureau in any manner in the development of the device.

Q. Were any Dashiell guns completed before his patent was issued?—A. I really do not know, but possibly there were.

Q. Had any been used?—A. No; not in service. There have been none used yet in the Navy.

Q. Had any been proved?—A. They may have been fired down at the proving grounds.

Q. Before the patent was issued?—A. Before the issue of the patent. But I do not remember as to the relative dates at all.

Q. In regard to the letter in which you used the plural word "assistants," do you recollect that Lieutenant Fletcher and Mr. Alger, both draftsmen attached to your office, were, at the time of the date of that letter, developing breech-block mechanisms of this character.—A. It is very possible that they were. I used the word in the plural there, as I told you, to refer to the work being done in the Bureau.

Q. You do not recollect of Mr. Alger working on that?—A. He has always had a great deal of work to do on breech mechanisms. He may have been working on it at that time and he may not.

Q. You do not recollect about that?—A. No.

Q. The words "assistants" is used in regard to your office in two senses, one general and the other specific?—A. Yes.

Q. In the former sense Dashiell was an assistant and in the latter he was not?—A. He was not employed in the Bureau; but they are all my assistants. I give them work to do and they assist me in carrying out my work, whether they are in the Bureau itself or stationed all over the country.

Q. Do you recollect saying anything on your examination in chief that as between the Seabury patent and the Dashiell mechanism you *regarded yourself* at ease in your selection because the Patent Office *had passed upon* the law?—A. I regarded that as prima facie evidence *that it was a novel idea.*

Q. As a matter of fact, you had made use of the Dashiell mechanism before it was patented?—A. Before the patent was issued. I took the chances on that. I could not wait to see whether he got a patent or not. We do not do business in that way. I trusted that he would get a patent, and I felt, of course, that the way was cleared up after he had the patent. A precisely similar case occurred recently, if you will allow me to state it.

Mr. WILSON. I object to the witness stating anything about a similar case.

The WITNESS. This is a very pertinent case. Mr. Maxim, a great inventor, came to me and stated that we were using an invention of his, and he would make us pay $500 apiece for every one of them we used. I was quite convinced that he was wrong. I had suggested to one of my assistants, previous to this statement of Mr. Maxim's, that he take out a patent to protect the United States. This is a case where the patentee gives the United States the use of his device. By a curious set of circumstances Mr. Maxim arrived at the Department and made claim on the Secretary of the Navy that we were using his device; and I was enabled, by the arrival that morning from the Patent Office of a notice to Mr. Fletcher, to meet his statement to the Secretary of the Navy, and to present the paper, which cleared the atmosphere entirely. Mr. Maxim was knocked out of court, and never made any claim whatever after that time. We are making, and have made, hundreds of the Fletcher mechanisms precisely in the same way.

Q. I understand you to say that all the time Mr. Seabury's blue prints were in your office you never gave permission to anybody to take them out of the office?—A. I never dreamed of their being out of the office until I saw in the newspapers that we had furnished this information. It had never been presented to my mind that such a thing was possible.

Q. Did you ever give anyone leave to use them in the office?—A. I do not need to give my own assistants leave to use them. They can go to the Bureau file and take anything out they want. I gave nobody permission to take them, and, in fact, I do not recollect of ever having given any permission about them.

Q. According to your present recollection you have given no person permission to use them?—A. None whatever.

Q. You had me furnished with a wooden model of the Seabury device?—A. Yes; I ordered one made, but I never saw it.

Q. Do you know how that was constructed, and whether it was constructed from blue prints or otherwise?—A. I do not know anything about it. I ordered the thing made, and this is the first time that I have ever seen it.

Q. You do not know anything about the construction of it?—A. No; I got a request from you, and gave the order to make it.

Redirect examination by Mr. WILSON:

Q. Did any board of the Navy Department pass upon the Dashiell device before it was applied to guns?—A. No.

Q. Had any board ever passed upon it?—A. Yes; since then.

Q. At what time?—A. I think two or three times, if I recollect right, they passed upon it—certainly in the 6-inch size.

Q. Can you tell me about when the first board approved it?—A. If I recollect aright, it was about eighteen months ago. I do not remember the date exactly.

Q. Who was on the board?—A. Captain Howell was the president

of the board and Commander J. E. Newell and Ensign Edward Simpson were members of it.

Q. What was the first work done by your Bureau in the direction of constructing the breech mechanism of Dashiell?—A. Probably the first work done was the general drawings at the Bureau of Ordnance, which are the drawings made before the detail drawings are made at the yard. After the detail drawings are made at the yard there are certain patterns to be made. That is the sequence of events.

Q. After the patterns are made, then, the work upon the actual mechanism is begun in the shops?—A. Yes, sir; from the detail drawings.

Q. When was that work first begun?—A. I do not know. I suppose it was probably begun just before I came to the conclusion stated in the letter. It was in the latter part of September, 1890.

Q. You mean that the actual work in the metal and in the shop of getting out the first mechanism was in the fall of 1890?—A. Yes; I think so.

Q. Were alterations found necessary in that work as it progressed, or did it work exactly according to the drawings, without change?—A. I never knew drawings to be exactly accurate in my mechanism. There are always alterations. That is the universal experience.

Q. And such alterations as there were in this case were made in the shop at the navy-yard?—A. They were made in the shop at the navy-yard, if there were any minor alterations. There were no alterations involving the principle that were referred to me, that I recollect of now.

Q. When was that first mechanism completed?—A. I have not the slightest idea. I suppose it was early in 1891.

Q. Was it put upon a gun that was already otherwise finished?—A. Sometimes we put these things into a cast-iron model and work it back and forth. It may have been done in that way at first.

Q. I mean after it was found to work satisfactorily.—A. It would be put on a 4-inch gun and sent down to be fired.

Q. Upon a 4-inch gun that was already otherwise completed?—A. Yes, sir.

Q. And only waited for the breech mechanism to complete the gun?—A. Yes, sir.

Q. And as soon as it was finished, therefore, it was sent to Indian Head for trial?—A. Yes. We had to wait a long time in order to get a case. We had nothing to test it with; no brass cases.

Q. You mean cartridge cases?—A. I mean cartridge cases. I think there was a long delay before we were able to do any work.

Q. This mechanism, then, was designed to be employed with metallic cartridge cases, or cartridge base?—A. Yes; a metallic cartridge case.

Q. As soon as that was obtained the gun was fired at Annapolis?—A. The gun was fired at Annapolis.

Q. Was that some time during the year 1891?—A. I imagine it was; yes, sir.

Q. You would fix it as some time in the spring of 1891, at Annapolis, Md.?—A. Yes.

Q. By whom was it proved?—A. By Lieutenant-Commander Dayton, the officer in charge of the proving ground at Annapolis at that time. Dashiell had already gone to Indian Head, a new station.

Q. And after proving the gun did you proceed to manufacture other *similar breech* mechanisms for additional guns?—A. There were long *delays and long* trials for that one gun. At that time we anticipated *the rivalry of* the Driggs mechanism, and that rivalry yet exists.

There were questions, I recollect now, of preference between the Driggs and the Dashiell mechanism. Seabury was not in it at all. We never thought of him at that time. We thought he was out of the race. I remember that both these mechanisms were tried by Mr. Drayton. Mr. Dashiell knew nothing about it, being stationed at the other proving ground. That was probably in the spring of 1891.

Q. Did you ever report to Lieutenant Seabury that his device was objected to because you regarded it as too complicated?—A. Not except in the terms of that letter.

Q. You advised him nothing beyond what is contained in the letter of September 29, 1890?—A. Nothing that I remember of now.

Q. And never, otherwise than by that letter, did you point out to him any objections that you saw in his mechanism?—A. I do not remember anything of the kind.

WM. M. FOLGER.

At 2 o'clock p. m. the committee adjourned.

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